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Public Health Reports

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Survival of Tubercle Bacilli in Various Sewage Treatment Processes

I. Development of a Method for the Quantitative Recovery of Mycobacteria From Sewage

By DAVID PRAMER, B.S., HOVHANNES HEUKELEKIAN, Ph.D.,
and ROBERT A. RAGOTZKIE, B.S.*

Although there have been many studies of the survival of *Mycobacterium tuberculosis* outside the animal host, only a very few have dealt with the presence and survival of the organism in tuberculosis sanatoria wastes and surface waters (*1–9*). Most of the latter, however, have been concerned largely with demonstrating the presence or absence of presumably tuberculous organisms in sanatorium wastes, rather than with the numbers actually present or surviving. In consequence, no conclusions can be drawn from these studies regarding the extent or significance of tuberculous contamination of sanatorium sewage.

In approaching this problem, the authors first found it necessary to devise a satisfactory method for the isolation and enumeration of tubercle bacilli in highly contaminated substrates—one which would completely suppress the large numbers of contaminating micro-organisms and leave unchanged the number of tubercle bacilli. The purpose of this paper is to report the development of such a method, and to present preliminary findings derived through the use of the method. Future reports will attempt to evaluate the significance of these findings through comparative studies of sewage from tuberculosis sanatoria and other sources in addition to bacteriological typing and virulence tests.

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This is the fifty-third of a series of special issues of PUBLIC HEALTH REPORTS devoted exclusively to tuberculosis control, which appear in the first week of each month. The series began with the Mar. 1, 1946, issue. The articles in these special issues are reprinted as extracts from the PUBLIC HEALTH REPORTS. Effective with the July 5, 1946, issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 10 cents a single copy. Subscriptions are obtainable at $1.00 per year; $1.25 foreign.

Development of the Method

In the past, the results of quantitative studies have been greatly influenced by the use of an acid or alkaline pretreatment. Rhines (*9*) infected various substrates with tubercle bacilli and utilized a pretreatment of 2 percent NaOH for 10 minutes, followed by cultivation on glycerol agar containing crystal violet. Although tubercle bacilli are relatively resistant, it seems probable that many would be destroyed in such procedures. As a matter of fact, Rhines himself showed that the concentration of NaOH he had utilized was bactericidal, and stated further that the crystal violet incorporated with the glycerol agar also reduced the number of tubercle bacilli. The authors therefore felt that this method was unsuitable for the present study.

There were three means by which the desired end could be accomplished: (1) the use of a selective medium; (2) the use of a selective pretreatment procedure; and (3) a combination of pretreatment and cultivation on a selective medium. Each of these methods was approached in turn and systematically studied.

Selective Medium

In his classical review on the tubercle bacillus and tuberculosis, Calmette (*10*) lists some 20 media for cultivation of the tuberculous organism. Since his work, the number of media has doubled, but the majority of them are not only complex organic preparations, but nonspecific as well.

Although Dubos' (*11*) medium is not selective, it is one which is relatively simple to prepare and which provides fairly rapid growth from small inocula. Moreover, when solidified with agar, this particular medium is transparent, so that colony study and differentiation are facilitated.

Dubos' agar medium was therefore chosen as a starting point in developing the method for this study, and attempts were made to render it selective. *Mycobacterium tuberculosis avium* was utilized as the test organism because of its close physiological resemblance to the human pathogen and because it could be more readily handled with the facilities available.

The addition of dyes (malachite green and methylene blue) to the medium revealed that the concentrations required to inhibit sewage organisms were bacteriostatic as well for the tubercle bacilli. Sulfadiazine was also found to inhibit growth of the test organism.

Since certain antibiotics have been shown to be selective in their action, their possible use suggested itself. A number of these antibiotics, however, while they are active against gram-negative and/or gram-positive organisms, and not against the tubercle bacillus, are toxic or insoluble, and so are not readily available or applicable.

Penicillin, active against gram-positive organisms, is water soluble and relatively inactive against tubercle bacilli. Grisein (*12*) is active against both gram-positive and gram-negative organisms, water soluble, and also inactive against tubercle bacilli. A combination of these two antibiotics therefore appeared to be a logical method for inhibiting growth of sewage organisms while at the same time permitting quantitative growth of tuberculous organisms.

A systematic laboratory study was made to determine the effect of these agents upon the test organisms. Varying concentrations of each antibiotic were incorporated with Dubos' basal medium prepared and utilized as follows:

KH_2PO_4	1.0 gm.
$Na_2HPO_4.12\ H_2O$	6.3 gm.

Heat in 100 ml. distilled water to dissolve

Add:

Distilled water	850 ml.
Enzymatic Digest of Casein	1.0 gm.
Ferric Ammonium Citrate	0.05 gm.
$ZnSO_4$	0.0001 gm.
$MgSO_4$	0.01 gm.
$CaCl_2$	0.0005 gm.
$CuSO_4$	0.0001 gm.
Agar	15.0 gm.

Dilute to 1 liter; autoclave; adjust to final pH of 6.5; and, when working with the pathogen, add 0.5 gm. bovine albumin aseptically.

To make this medium selective, freshly prepared aqueous solutions of antibiotics were added to the petri dishes in amounts required to obtain desired final concentration after addition of the agar. Liquefied agar was poured into the plates and thoroughly mixed with the antibiotics by swirling. The plates were then allowed to solidify and were incubated overnight to eliminate some of the water of condensation and to allow contamination to grow out.

The inoculum was then placed upon the surface of the solidified plate. Dilution blanks were prepared by mixing 1 part basal medium with 3 parts distilled water, liquefied, and cooled to 45° C. Dilutions were then run, and a 1 ml. inoculum was placed on the surface of the agar. The plate was immediately rotated to obtain equal distribution of the inoculum, allowed to solidify, and incubated at 37° C. for one week, after which plate counts were made.

The results obtained may be summarized as follows:

1. At a maximum concentration of 5 units/ml., penicillin yields a 40–56 percent inhibition of the organisms normally present in sewage without inhibiting the growth of *M. tuberculosis avium.*

2. At a maximum concentration of 50 units/ml., grisein yields a 22 percent inhibition of sewage organisms without inhibiting the avian tubercle bacillus.

The effects of combining both penicillin and grisein with the basal medium at the given maximum concentrations are presented in table 1.

It appears that the addition to Dubos' agar medium of 5 units of penicillin and 50 units of grisein per ml. suppresses 74 to 82 percent of the organisms usually present in raw sewage, without inhibiting the growth of *M. tuberculosis avium.*

Table 1. *Effect of penicillin and grisein mixtures on* M. tuberculosis avium *and normal sewage organisms*

Penicillin concentration [1] (units/ml.)	Replication	Recovery of *M. tuberculosis avium*		Reduction of sewage organisms	
		Range	Mean	Range	Mean
		Percent			
40	1	18	18		
25	1	34	34		
7	1	68	68		
5	2	83-90	86	74-82	78
[illegible]	1	86	86	74	74

[1] All media contained 50 units of grisein per ml.

Pretreatment

The value of subjecting the study samples to an acid or alkaline pretreatment procedure was explored. Typical results (table 2) show that exposure to alkali is a drastic pretreatment means.

Table 2. *Effect of exposure to NaOH on* M. tuberculosis avium

Length of exposure (minutes)	Percent kill of *M. tuberculosis avium*		
	N/4 NaOH	N/10 NaOH	N/100 NaOH
10	99+	93	90
30		96	93
60			95

Of the other pretreatment methods which suggested themselves, the utilization of heat seemed the most practical. Tests were made with temperatures between those used for incubation and those required for pasteurization for varying lengths of time. Typical results (table 3) indicated that the use of heat at 50° C. for a period of 1 hour had no

Table 3. *Effect of exposure to 50° C. on* M. tuberculosis avium *and sewage organisms (representative results)*

Length of exposure (minutes)	*M. tuberculosis avium* per ml.	Sewage organisms per ml.
Start	830,000	150,000
20	780,000	40,000
40	890,000	23,500
60	840,000	11,700

effect on the number of tubercle bacilli present in a sample, but destroyed 92 percent of the sewage organisms.

Combined Method

Based on the results obtained from the separate use of the selective culture medium and of the preheat treatment for 60 minutes at 50° C., and assuming that these results are reliable, it is possible to predict that the combined use of these two methods should result in a higher suppression of sewage organisms than by heat or antibiotics alone. At the same time, the method allows successful quantitative recovery of tubercle bacilli originally present in the sewage material.

To test this, a quantity of raw sewage was filtered, inoculated with an enumerated suspension of *M. tuberculosis avium*, and the proposed combination method was applied. Counts for normal sewage organisms were made following 48 hours of incubation at 37° C., and all colonies developed within that time were marked. Since plates inoculated with a pure culture of *M. tuberculosis avium* showed no growth following 48 hours of incubation, all plates were rechecked following 7 days of incubation to obtain the *M. tuberculosis avium* count. (This differential time of incubation was subsequently utilized as an integral part of the method.)

Application of the method to artificial mixtures of sewage and *M. tuberculosis avium* revealed that preheating for 30 minutes instead of 60 minutes at 50° C. yielded better recovery of the tubercle bacilli present. Since previous work had shown that 50° C. for 60 minutes is not effective, it appears that prolonged heating may make the organism more susceptible to antibiotic action. In subsequent work, therefore, a 30-minute exposure to 50° C. was utilized as the pretreatment procedure.

The results of combining the 30-minute pretreatment with heat and cultivation on media containing 50 units of grisein and various concentrations of penicillin ranging from 2 to 7 units/ml. are given in table 4. Quantitative recovery of *M. tuberculosis avium* was

Table 4. *Effect of antibiotics and pretreatment with heat on* M. tuberculosis avium *and normal sewage organisms*

Penicillin concentration[1] (units/ml.)	Replication	Recovery of *M. tuberculosis avium*		Reduction of sewage organisms	
		Range	Mean	Range	Mean
		Percent			
2	1	92	99	94	94
3	5	88–110	98	83–93	87
4	5	88–104	96	88–93	88
5	4	89–101	96	89–97	93
7	3	63–81	72	92–98	95

[1] All media contained 50 units of grisein per ml.

obtained on media containing 2 to 5 units of penicillin/ml. while the average inhibition of the sewage organisms varied from 87 to 94 percent. A concentration of seven units of penicillin/ml. was found to inhibit the growth of *M. tuberculosis avium* somewhat, with the recovery averaging 72 percent while the inhibition of sewage organism was increased only slightly.

Application of the Method

Laboratory Studies of Sewage Treatment Processes

Sewage was inoculated with avian tubercle bacilli and subjected to various treatment processes in the laboratory. The number of tubercle bacilli present in the sewage before and after treatment was determined by the developed method.

Results obtained in these laboratory studies are as follows:

1. Quiescent sedimentation for 6 hours showed no significant change in the number of tubercle bacilli present.
2. Chemical coagulation with ferric chloride at a pH of 5.0, followed by flocculation and sedimentation, removed more than 99 percent of the tubercle bacilli present in the sewage.
3. Continuous application of sewage to sand filters removed 99 percent of all tubercle bacilli originally present, and appeared to be far more efficient than intermittent flooding.
4. Aeration for 24 hours at a rate of 22 cu. ft./gal./day had little effect on the number of tubercle bacilli.
5. The effectiveness of chlorination was determined by correlating the free chlorine residual with the number of tubercle bacilli surviving. A free chlorine residual of 0.9 ppm was found necessary to reduce the number of tuberculous organisms to less than 5 per ml. This is equivalent to a 2–5 ppm residual by ortho-tolidine, and is much higher than that normally maintained for disinfection of ordinary municipal sewage.

Preliminary Study of Sanatorium Sewage Treatment Plant

As a preliminary field trial, the developed method was also used to detect the presence of mycobacteria in the different units of a tuberculosis sanatorium sewage treatment plant and in the stream receiving the plant effluent. The treatment processes utilized by the plant under study are sedimentation, trickling filters, secondary settling, digestion, and chlorination. Plates were prepared from samples obtained from the plant and receiving stream and incubated for 7 days, at which time the contaminants on the plates were marked. The plates were then incubated a month longer, after which the colonies of mycobacteria were picked and subcultured in Dubos' liquid medium. A slide was prepared from each culture, stained, and studied microscopically.

By utilizing the developed procedure, it was possible to isolate acid-fast bacilli, similar in morphology and staining characteristics to *M. tuberculosis*, from the raw sanatorium waste, the effluent of the sanatorium treatment plant, the ripe sludge, fresh solids, and from the stream receiving the plant effluent. The concentration of these acid-fast bacilli was found to be as follows:

	Per ml.
Raw sewage	1, 500
Plant effluent	10
Receiving stream	±10
Settled raw sludge	100, 000
Digested sludge	10, 000

The significance of these findings will be evaluated in future reports which will deal with virulence and typing of the acid-fast rods discovered in these preliminary trials, and with comparative findings from nonsanatorium sewage.

Discussion

Preliminary results indicate that the developed method, that is, pretreatment utilizing heat at 50° C. for 30 minutes and cultivation on Dubos' medium modified by the addition of penicillin and grisein, is effective for the quantitative recovery of tubercle bacilli from highly contaminated materials. It is felt that the method is particularly well adapted to laboratory survival studies of a quantitative nature, and one which, within limits, is suitable for the primary isolation of the tuberculous organism from contaminated material.

It would appear, therefore, that the method could be readily adapted to diagnostic work. Recent studies (*13*, *14*) indicate the importance of cultural methods in the diagnosis of tuberculosis and have made clear that a majority of erroneous negative diagnoses are due to the effects of alkali pretreatment and of the particular kinds of selective media used. Utilization of the method developed in this study would eliminate pretreatment with NaOH, yield positive cultures from small inocula, and prevent loss of the acid-fast staining characteristic. Dubos' medium, as utilized in this procedure, provides rapid growth from small inocula, and is more easily prepared than some commonly used, complex organic media. Moreover, the transparent property of this medium facilitates identification of typical tubercle bacilli colonies (*15*). The use of antibiotics to render the medium selective appears to be superior to that of dyes, in that the latter inhibit growth of tuberculous organisms at the concentrations usually employed.

Although the developed method appears sound, there are four possible complications which may cause error in recovery results:

1. Even after 48 hours' incubation at 37° C., when contaminant

colonies are marked, more contaminants may grow out to cause error in the differential count.

2. Organisms present in the sewage may produce a penicillinase or grisein-destroying substance which would eliminate the action of the antibiotics, thus allowing the contaminants to grow out and cause error.

3. With prolonged incubation, some sewage organisms may develop resistance to the antibiotics and grow out to cause error.

4. Prolonged exposure to 37° C. may in itself destroy antibiotic action.

The extent to which these factors might cause error in final results was explored by inoculating some plates containing the modified medium with raw sewage and incubating them for a prolonged period at 37° C. Results obtained from daily counts (table 5) show that there was no significant increase in the number of contaminant colonies after 48 hours. Where contaminant colonies do develop after 48 hours, they are so few that an experienced observer can readily differentiate between them and tuberculosis colonies. Moreover, the greater the number of tuberculosis colonies counted later, the more insignificant this possible error.

Table 5. *Effect of prolonged incubation on the inhibition of sewage organisms by modified Dubos' medium (representative results)*

Days of incubation	Number of colonies		Days of incubation	Number of colonies	
	Plate 1	Plate 2		Plate 1	Plate 2
1	27	27	6	31	35
2	30	32	7	32	35
3	30	32	14	32	35
4	31	33	35	32	35
5	31	35			

Summary and Conclusions

A satisfactory quantitative method for the enumeration of tubercle bacilli in sewage materials is described. This method, which employs a pretreatment procedure and cultivation on a selective medium, suppressed 87 to 94 percent of sewage organisms and permitted successful quantitative recovery of tuberculous organisms present in a given sample.

The laboratory application of the developed method to the problems of this study reveals that the sewage treatment processes best suited for the removal of tuberculous organisms are (1) chemical coagulation with ferric chloride, followed by settling; (2) continuous filtration through sand at a rate of 240,000 gal./acre/day; and (3) chlorination to an 0.9 ppm free chlorine residual. Used in combination, the effectiveness of these methods is, of course, enhanced. Except for chlorination, the efficiency of each of the treatment processes in the removal of *M. tuberculosis avium* was more or less equal to that for sewage organisms. In chlorination, however, residuals of less than 0.9 ppm appear to be ineffective against tuberculous organisms.

A preliminary survey was made for mycobacteria in a sanatorium sewage treatment plant which utilizes sedimentation, trickling filtration, and chlorination. Acid-fast rods were found in the raw sewage and in diminished numbers in the plant effluent and the stream receiving the effluent. They were also found in the fresh solids and digested sludge in greater numbers than in the raw sewage. In general, these findings correspond to those obtained in laboratory treatment tests. The results of these field studies will be further refined and evaluated in future work, which will include typing and virulence testing of the recovered acid-fast organisms.

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Role of the Nurse in Research

When a new drug or other product gives promise of benefiting human beings, the modern procedure is to give it every possible test and trial both in the laboratory and in clinical application. Whether these tests begin in the laboratory or not, the final analysis must always rest upon a clinical evaluation among human beings.

The role of the nurse in such investigations is logical and necessary since she is trained both in administering medications and treatments and in close personal observation of patients. Her usefulness in research, however, depends upon her training in the nursing technique itself and her understanding of the significance of the technique in collecting data. Her value in research, and the opportunities it offers her, increase with her training and experience in that field.

Certainly an intense and constant interest in the problem she is helping to solve and an intellectual curiosity about the outcome of the whole project is essential to the research nurse's success. If she is to have a continuing interest in a research problem, she must know specifically what it is about; she must have a general picture of the methods to be used in the investigation and an idea of why these particular methods were selected. With this knowledge, she can help constructively in planning the programs on the basis of her practical observations in the field. Her knowledge, experience, and ingenuity can be called upon in planning not only the technical nursing procedures, but the handling of materials and equipment and the general logistics of the whole program.

In carrying out field research responsibilities a nurse who has had training and experience in public health is at a great advantage, particularly when the investigation requires administrative contacts with institutions and communities, and public speaking to orient and organize personnel who are cooperating in various localities. Moreover, a nurse with some knowledge of statistical procedures will have an appreciation of the necessity for complete and careful performance and uniform recording of procedures and observations. She will have an awareness of the many subtle biases that may creep into a study.

To illustrate these statements, we can consider the investigation of BCG vaccination against tuberculosis in the Public Health Service for the past several years. The duties of the nurses in this study have been many and varied, and have involved considerable responsibility.

In the BCG study the nurses have taken a large part in formulating

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From the Field Studies Branch, Division of Tuberculosis, Public Health Service. Speech given by S. A. Nurse Officer Patricia B. Geiser at the Metropolitan Washington Tuberculosis Conference, March 22, 1950.

procedures for the standardized care of equipment, the performance of skin tests, methods of inoculation, and in general for the innumerable small but important matters that may spell the success or the failure of a field project. During part of this program, BCG vaccine was flown from Copenhagen, Denmark, to various small towns in America. The vaccine must be used within a few days after its manufacture, and so it was necessary for the nurses to receive it at the airport. They had to keep track of possible changes in airplane schedules that were not known to the shipper in Copenhagen and to arrange with airline officials for the refrigeration and proper delivery of the vaccine so that it could reach a given point at a given time. Nothing is more embarrassing than to have one or two thousand people standing in line ready to be vaccinated, while the vaccine to be used has been placed on the wrong airplane and has not arrived. When the vaccine does arrive, if too long a time has elapsed since it was made, it must be discarded and the program canceled. If this happens, the public's interest is lost and the whole program is jeopardized.

The nurses in the BCG research program have been concerned purely with the collection of data and not with the drawing of conclusions. This means not that the nurses are incapable of drawing conclusions, but that they must constantly guard against doing it, because such conclusions would constitute a bias in their work. In other words, they cannot accurately measure the effect of a procedure if they have already reached the conclusion that that procedure is either good or bad. Training themselves to avoid prejudice in these matters is perhaps the most difficult phase of their work. It is only human to bring a certain prejudice to any observation.

Nurses engaged in research work must be entirely honest in their reporting. Honesty in this sense means complete objectivity and adherence to the standards set, regardless of personal opinion. Every effort must be made to make sure that the words and terms used in descriptions have the same meaning to all persons concerned. This is easy when we are simply measuring in terms of millimeters or centimeters, but it is extremely difficult when we are talking in such terms as "firm," "elevated," "clearly defined," and "well circumscribed." It is the nurse's responsibility to be sure that what she thinks is "clearly defined," is exactly the same as what the other nurses regard as "clearly defined." Even the slightest variation in such interpretations can grossly distort the statistical findings. I am, of course, referring to the reading of tuberculin tests. As you know, reactions must not only be measured in size but must be described with qualitative adjectives which indicate the quality of induration.

A great deal of correspondence becomes essential in a program of this sort. It is important that such correspondence be explicit in its meaning and in the dates stated, and that it be carefully timed.

A hospital official, for instance, must be given sufficient advance notice if we ask him to arrange a schedule for the testing or vaccinating of patients or employees. In an institution that operates a 24-hour service, schedules must be arranged in such a manner that employees coming on duty can be processed at the same time as those going off duty, and care must be taken to avoid scheduling programs on holidays. Otherwise an entire shift might be missed.

One of the most important requirements of a nurse on field duty in a research project that covers extensive territory is a thorough understanding of the geography and transportation facilities of the area. Otherwise, she will find herself unable to get from one city to another and to be on hand at the time she is expected. She must therefore have a good knowledge of air, rail, and bus transportation.

The intricacies of the Federal, State, and local civil service employment regulations must be well understood, because a nurse is often called upon to hire and train clerks in the field for temporary duty.

The research nurse is often alone in carrying out her work, in a location far removed from the central organization and its medical officers, and she must be prepared to answer questions tactfully and competently. There is nearly always some limit to the amount of information which she is free to give on any research problem, and she must learn to restrict her replies to questions without giving offense.

One of our BCG programs is concerned with the tuberculin testing and vaccinating of student nurses and medical students in a certain area in New England. The investigation calls for X-ray of all participants and, within a period of 6 weeks, the tuberculin testing of all participants with negative X-rays. Tuberculin tests are read 72 hours after administration, and the participants who are found eligible are vaccinated. For research purposes, several varieties of tuberculin may be used in different tests, different dosages may be given, and the tests may be read at different periods, i. e., 48 hours after testing, as well as the usual 72. At the same time the vaccination itself may have several variables. We may use different vaccines from different producers, at different periods after manufacture, in various doses, and may administer the vaccination by several different techniques. All these factors must be accurately recorded for each person vaccinated. The nurse returns 3 days after vaccination to observe the reaction, and again in 30 days for a similar observation. After 50 days, she returns once more to test both the vaccinated and the unvaccinated to determine how many converted from negative to positive in their tuberculin tests. This procedure may be followed up again at other periods such as 6 months or 1 year after vaccination. And at each of these visits the new arrivals at the institution begin the process all over again.

The problems presented in another environment may be entirely different from those just described. In the program among American Indians which took us through the most remote areas of the West, we were confronted by a variety of unique and challenging situations arising from the cultural background of the people. For instance, in one reservation we found it impossible to obtain the names of deceased parents, since the Indians refused to allow the names of dead persons to be used. We were obliged to consider carefully the various tribal customs in each area as well as to train the Indian nurses in the technical conduct of the program.

In the midst of the multitude of problems arising from such situations as mentioned, the nurse must continue to maintain strict scientific accuracy in her work so that the records of her observations present data that will be useful to the statistical analyst. The accurate recording of the many variations in the procedure is done on mark-sensing IBM cards. Since the nurse is called upon to instruct the clerks who are making these records, it is necessary that the nurse herself be aware of the techniques of coding the data on the IBM cards.

The IBM cards are sent to the central office and provide the data for the eventual statistical evaluation of the study. Since statistical analysis loses its purpose if the accuracy of the data is doubtful, it is extremely important for a nurse to make sure that the data being collected are as accurate as is humanly possible. Absolute accuracy in procedures involving human observations is of course impossible to achieve, but one must aim toward it in gathering data.

It is apparent that the duties of a nurse engaged in medical research involve many problems other than those directly associated with usual nursing responsibilities. Some important qualifications are:

1. A real interest in, and an intense curiosity about, the problem being investigated, as well as an understanding of the basic nature of the specific problem. Without these it is not humanly possible for her to maintain a high quality of production in detailed work.
2. The physical stamina for what may at times be a rigorous life.
3. Ability to perform the work involved, to deal with people effectively, to arrange schedules, to understand transportation, and so forth.
4. Adaptability, ingenuity, and common sense in planning and carrying out the programs. It is here in particular that the public health nurse is at an advantage.
5. Willingness to maintain constantly a strict adherence to the rules or standards which have been set for the performance of the procedure.
6. Ability to travel, to work, and to live in strange surroundings, contentedly, in spite of considerable isolation at times.
7. Ability to establish necessary contacts with local people and to represent her organization in such a way as to insure herself, or any

other representatives of her organization, a welcome in the future.

This is a brief outline of what nursing participation in research may involve, and in general it may sound a little severe. Indeed it is severe from the standpoint of the demands it makes upon the time and energies of a nurse. It is never a 9 to 5 job. It means living out of suitcases, waiting in railway stations and airports, meeting airplanes in the middle of the night, dashing in and out of hotels and telegraph offices. Often pie and coffee must substitute for a meal, and the sleep is not too regular. It means, above all, securing the cooperation of many different people each of whom must be separately and individually introduced to the nature of the project.

But the compensations of this kind of work should not be overlooked. The nurse is respected wherever she goes; she is well informed on a subject that is likely to be a mystery to most people but which is always interesting. She meets many people, some in high office, and while she must use tact in her dealings with them, she need never be subservient. In the course of her traveling she learns much that will stand her in good stead throughout her life. No matter how small a part she may play in a large undertaking, it is a dignified part and she has the advantage of knowing that her work is fundamental to the success of the project. No matter how routine the procedures may be, the scene is continually changing and her life is never monotonous. The nurse becomes in each locality a sort of special person, an authority on a fascinating subject, medical research.

Protecting Photofluorographic Personnel From Excessive Radiation

By Willard W. Van Allen*

In photofluorography, radiation hazards are present to a considerably greater extent than in other roentgenographic diagnostic procedures. This is due both to the higher energy requirements of the photofluorographic techniques, and to the characteristics of the equipment itself.

The quantity of radiation required for a photofluorographic exposure is several times that used for a conventional radiograph. Also, it is not unusual for a single photofluorographic machine to produce over 500 exposures per day, and to operate at this rate for many consecutive days. With this combination of a great number of exposures and high radiation requirements for each exposure, the amount of secondary radiation in the vicinity of the equipment is, of course, far greater than that encountered in large-film work.

Furthermore, most photofluorographic equipment is portable, semiportable, or mounted in mobile trucks, and operating space is usually limited. Consequently, it is not always possible to employ the same protective measures which apply readily to permanent installations. Protective screens, for example, are limited in size, especially in mobile installations, by the requirement of movability and by the necessity for providing space for the movement of people to and from the X-ray equipment. Obviously, these considerations cannot be interpreted as an excuse for inadequate protective measures. They do, however, introduce the necessity for more careful design and placement of protective barriers, more thorough attention to radiation fields actually present, and full cooperation on the part of both supervisors and operating personnel to assure completely safe operating conditions.

The Electronics Laboratory has undertaken two programs in an effort to find the most effective procedures for the protection of photofluorographic personnel. These are (1) the continuous monitoring of the amount of radiation actually received by its personnel each week, and (2) the study of radiation fields surrounding photofluorographic installations used by Public Health Service teams. These programs are still in progress, and a more extensive and detailed report will be published later.

Radiation Monitoring

In spite of the fact that ideal protective devices are difficult or impossible to realize, radiation exposure can very definitely be kept within safe limits. Complete cooperation by all concerned is the means by which this can be achieved.

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Unfortunately, it is possible for technicians, through carelessness, ignorance or both, to circumvent even the most carefully designed protective devices. Consequently, the Electronics Laboratory has instituted a system of continuous monitoring of the exposure received by all personnel working in photofluorographic installations. Each employee is given a plastic badge containing a dental film packet, and required to wear the badge for 1 week while on duty. At the end of each week the badges are returned to the laboratory for processing under standard conditions. The radiation received is then determined from the density of the developed image.

The results of the first 5 weeks of monitoring during a recent survey are summarized in the table and indicate the amounts of radiation actually received by operating personnel. What is more important, however, these results show what improvement can be made in only a short time through the conscientious observation of safety rules by supervisors and operating personnel alike.

Percent of operating personnel receiving more than the indicated amount of radiation

[Milliroentgens per week]

Period	25	50	75	100	150	200	300
	Percent						
First week	90	50	45	36	30	25	20
Second week	80	52	40	36	16	4	0
Third week	68	44	32	16	8	8	8
Fourth week	74	36	31	5	5	5	0
Fifth week	50	12	4	4	0	0	0

At the start of the check, 20 percent of the technicians received radiation in excess of 300 milliroentgens per week, which is generally considered the limit of allowable radiation. As a result of follow-up procedures, however, the percentage of personnel receiving high dosage rates dropped from week to week, until during the fifth week, no one received more than half this amount. Similarly, although 50 percent received more than 50 milliroentgens per week during the first week, only 12 percent received more than this amount during the fifth week. In other words, the majority of technicians succeeded in reducing their radiation dosage to less than one-sixth the accepted limit of 300 milliroentgens per week.

Radiation Fields

The study of radiation fields serves to show where radiation hazards exist and ways of avoiding excessive exposure. Figure 1 shows, by

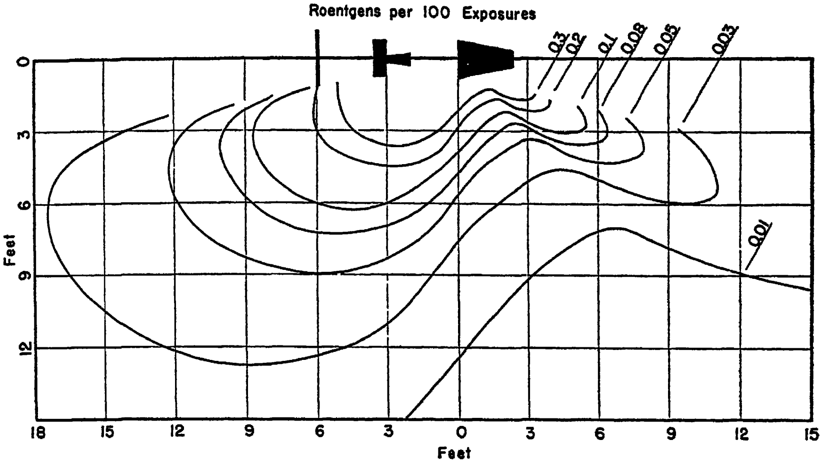

Figure 1. **Fields of secondary radiation surrounding a typical photofluorographic installation in an unconfined area.**

means of isodose curves, the field of secondary radiation surrounding a typical photofluorographic installation in a large room with no confining walls. These measurements were made in a unit set up in the train concourse of the North Station in Boston, and are probably representative of most installations in large rooms.

The scattered radiation originated in a presdwood phantom 12.5 cm. thick and 40 cm. square. For this purpose, such a phantom is roughly equivalent to a human subject of somewhat more than average size. At 85 KVP and 200 MA, exposures were approximately 25 milliampere-seconds. The isodose curves are labeled to show roentgens per 100 exposures under these conditions.

The general pattern of the field on the tube side of the photofluorographic hood was found to vary little from one installation to another. On the other hand, the shape of the isodose curves on the side of the screen opposite the tube showed wide variations with different units. This was clearly due to differences in accuracy of tube alignment and in efficiency of coning.

In some installations, for example, the radiation field patterns behind the hood showed a region of higher intensity on one side of the central axis than on the other. In others, the pattern is symmetrical on both sides—sometimes showing the bulge on both sides, sometimes not—depending on the effectiveness of coning of the primary beam. While the general shape of the field patterns encountered in different installations is roughly as shown in figure 1, it should be remembered that the fields as a whole vary with differences in exposure, the size of the subject, type of screen and film used, and in phototimer density setting.

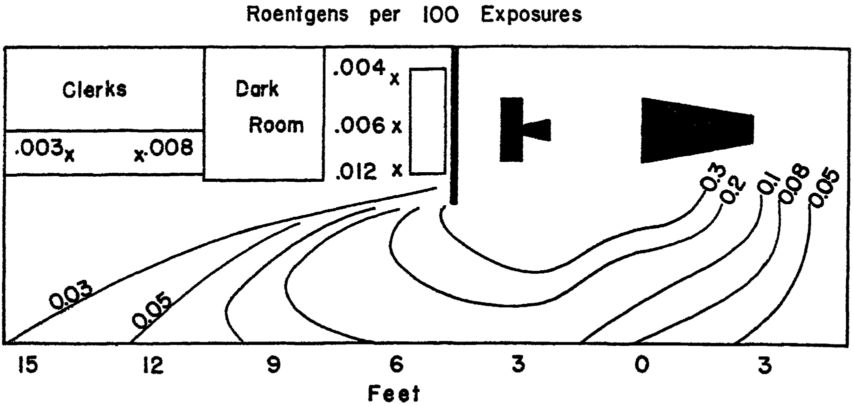

Figure 2. Fields of secondary radiation in a mobile (bus) photofluorographic installation.

Figure 2 shows the radiation field pattern under the same exposure conditions as used in figure 1, but with the photofluorographic machine installed in a mobile bus unit. This, therefore, represents the other extreme, where space is limited and walls and ceiling are near the source of radiation.

In addition to the field pattern outside the protective barriers, figure 2 includes isolated measurements of radiation at five points behind the protective screens, three at the control stand position, and two at the clerk's desk.

A study of the radiation fields in the two diagrams provides the answers to many questions about safe operating practice. It is obvious that operating personnel must stand behind the protective screens during exposure.

Unfortunately, an operator can stand just outside the protective screen and still reach the exposure switch in most cases. In this position, the operator would attain the maximum allowable dosage of 300 milliroentgens per week in from 100 to 150 exposures of the order described above. This represents only a fraction of a single day's work in most cases. On the other hand, if the operator positions himself squarely behind the protective screen, he may expect to make some 5,000 exposures per week before exceeding the 300-milliroentgen limit.

Similarly, other personnel employed at a particular unit must also be provided with suitable protection. This is especially important in mobile units where two or more technicians are on duty, and protective barriers are frequently limited to a single screen behind the tube. In a mobile bus unit, no position in the aisle can be considered completely safe for exposures totaling more than a fraction of a typical week's work.

Incidence of Disease

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

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UNITED STATES

Reports From States For Week Ended June 17, 1950

The total number of reported cases of poliomyelitis in the United States increased from 207 (corrected figure) last week to 236 for the current week. For the corresponding weeks of last year, 243 and 278 cases, respectively, were reported. The largest increase was shown in Texas, from 61 cases last week to 96 cases for the current week. Only 2 other States reported a total of 10 or more cases for the current week. These were California (19) and South Carolina (10). The cumulative total number of cases for the current "disease" year or the total since the seasonal low week (March 18, 1950) is 1,326 which may be compared with 1,381 for the corresponding period last year. Corresponding cumulative totals show Texas with 471 cases and California with 182 cases which may be compared with 464 and 139 cases, respectively, last year.

Comparative Data for Cases of Specified Reportable Diseases: United States

[Numbers after diseases are International List numbers, 1948 revision]

Disease	Total for week ended—		5-year median 1945-49	Seasonal low week	Cumulative total since seasonal low week		5-year median 1944–45 through 1948–49	Cumulative total for calendar year—		5-year median 1945–49
	June 17, 1950	June 18, 1949			1949–50	1948–49		1950	1949	
Anthrax (062)	-------	2	(1)	(1)	(1)	(1)	(1)	19	30	(1)
Diphtheria (055)	80	94	162	27th	7,237	8,648	13,437	2,966	3,534	5,871
Acute infectious encephalitis (082)	22	13	10	(1)	(1)	(1)	(1)	317	246	208
Influenza (480–483)	766	562	590	30th	273,379	109,372	178,747	242,849	73,102	135,189
Measles (085)	12,802	14,073	14,073	35th	266,501	602,580	524,160	247,371	550,187	489,214
Meningococcal meningitis (057.0)	75	55	61	37th	3,048	2,741	2,975	2,135	1,897	2,003
Pneumonia (490-493)	975	1,003	-------	(1)	(1)	(1)	-------	53,220	48,155	-------
Acute poliomyelitis (080)	236	278	183	11th	[2] 1,326	1,381	908	[2] 2,460	2,296	1,375
Rocky Mountain spotted fever (104)	28	25	25	(1)	(1)	(1)	(1)	128	180	132
Scarlet fever (050)	729	875	1,334	32d	53,638	77,499	83,689	37,199	54,955	57,003
Smallpox (084)	1	-------	-------	35th	44	49	190	24	39	136
Tularemia (059)	30	28	23	(1)	(1)	(1)	(1)	476	591	474
Typhoid and paratyphoid fever (040, 041) [3]	61	68	82	11th	730	709	811	1,240	1,197	1,283
Whooping cough (056)	2,743	1,294	2,106	39th	85,779	35,019	79,018	64,243	24,986	47,752

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[1] Not computed.

[2] Additions: Arkansas, weeks ended Apr. 15, June 3, and June 10, 1 case each.

[3] Including cases reported as salmonellosis.

The total number of reported cases of influenza for the current week was 766 which may be compared with 1,015 last week and 562 for the corresponding period last year. The 5-year (1945–49) median was 590. The cumulative total number of cases of influenza reported this calendar year is 242,849 which may be compared with the 5-year median of 135,189.

Reported cases of infectious encephalitis numbered 22 for the current week as compared with 12 the preceding week and 13 for the corresponding week of last year. The 5-year median was 10 cases. The cumulative total number of cases reported for this calendar year was 317. The corresponding cumulative 5-year median was 208; the highest year since 1944 was 1949 when a corresponding total of 246 cases was reported.

The total number of cases of tularemia reported for the current week was 30 which may be compared with 12 the previous week and 28 for the corresponding week last year. The 5-year median was 23 cases. The cumulative total reported for this year is 476 cases of tularemia.

One case of smallpox was reported in Arizona which may be compared with 1 case reported in Kansas last week. No cases were reported for the corresponding weeks of 1947–49. Total number of cases of smallpox reported this year was 24 which may be compared with 39 reported for the corresponding period last year and 244 for 1946, the high year since 1944.

Of 42 States reporting on rabies in animals, 23 and the District of Columbia reported no cases. The remaining 18 States reported 113 cases with the largest numbers in New York (20), Indiana (17), and Georgia (13).

Deaths During Week Ended June 17, 1950

Data for 94 large cities of the United States:	*Week ended June 17, 1950*	*Corresponding week, 1949*
Total deaths	8, 791	8, 851
Median for 3 prior years	8, 632	
Total deaths, first 24 weeks of year	231, 300	228, 920
Deaths under 1 year of age	629	652
Median for 3 prior years	652	
Deaths under 1 year of age, first 24 weeks of year	14, 944	15, 584
Data from industrial insurance companies:		
Policies in force	69, 748, 806	70, 361, 365
Number of death claims	12, 310	12, 379
Death claims per 1,000 policies in force, annual rate	9. 2	9. 2
Death claims per 1,000 policies, first 24 weeks of year, annual rate	9. 8	9. 6

Reported Cases of Selected Communicable Diseases: United States, Week Ended June 17, 1950

[Numbers under diseases are International List numbers, 1948 revision]

Area	Diphtheria (055)	Encephalitis, infectious (082)	Influenza (480–483)	Measles (085)	Meningitis, meningococcal (057.0)	Pneumonia (490–493)	Poliomyelitis (080)
United States	80	22	766	12,802	75	975	236
New England	**1**	**1**		**1,394**	**1**	**47**	**2**
Maine				129		8	
New Hampshire				4		1	1
Vermont				2			
Massachusetts	1	1		868	1		
Rhode Island				1		10	1
Connecticut				390		28	
Middle Atlantic	**6**	**12**	**2**	**3,959**	**10**	**242**	**14**
New York	3	11	[1] 1	1,475	6	158	9
New Jersey	2	1	1	1,608	1	38	2
Pennsylvania	1			876	3	46	3
East North Central	**7**	**1**	**17**	**4,031**	**17**	**158**	**19**
Ohio	3		1	663	10	28	2
Indiana				196	2	4	2
Illinois	1			1,366	1	80	3
Michigan	1	1	3	758	2	41	7
Wisconsin	2		13	1,048	2	5	5
West North Central	**3**	**2**	**13**	**465**	**6**	**34**	**17**
Minnesota		1	6	114	3	6	1
Iowa	1	1		127		1	3
Missouri				95	2	8	9
North Dakota			1		1	9	
South Dakota				24			1
Nebraska			6	70		5	2
Kansas	2			35		5	1
South Atlantic	**23**		**170**	**550**	**9**	**97**	**25**
Delaware				19	1		
Maryland	1		1	88	1	22	
District of Columbia			2	28		9	1
Virginia	5		139	103	2	38	1
West Virginia	2		16	116	1	15	3
North Carolina	4			76	2		2
South Carolina	6		4	17		2	10
Georgia	5		7	23	1	6	3
Florida			1	80	1	5	5
East South Central	**10**		**20**	**292**	**7**	**52**	**19**
Kentucky	2		1	124	1	14	6
Tennessee			5	116	5		
Alabama	4		12	32	1	24	
Mississippi	4		2	20		14	9
West South Central	**18**	**3**	**489**	**507**	**15**	**275**	**111**
Arkansas	1		16	33		8	4
Louisiana	2		1	11	1	35	2
Oklahoma	1		32	12	1	16	9
Texas	14	3	440	451	13	216	96
Mountain	**5**	**2**	**49**	**782**	**1**	**36**	**7**
Montana	2		2	16			
Idaho			8	75			2
Wyoming				13		3	
Colorado		1	18	367	1	13	1
New Mexico	2			23		11	1
Arizona	1	1	21	11		6	3
Utah				277		3	
Nevada							
Pacific	**7**	**1**	**6**	**822**	**9**	**36**	**22**
Washington				77	2	1	1
Oregon			3	20		16	2
California	7	1	3	725	7	19	19
Alaska						1	
Hawaii			1	1			

[1] New York City only.

Reported Cases of Selected Communicable Diseases: United States, Week Ended June 17, 1950—Continued

[Numbers after diseases are International List numbers, 1948 revision]

Area	Rocky Mountain spotted fever (104)	Scarlet fever (050)	Smallpox (084)	Tularemia (059)	Typhoid and paratyphoid fever [1] (040, 041)	Whooping cough (056)	Rabies in animals
United States	28	729	1	30	61	2,743	113
New England	---	**112**				**354**	
Maine	---	3	---	---	---	62	---
New Hampshire	---	---	---	---	---	3	---
Vermont	---	---	---	---	---	23	---
Massachusetts	---	91	---	---	---	100	---
Rhode Island	---	4	---	---	---	58	---
Connecticut	---	14	---	---	---	108	---
Middle Atlantic	**4**	**154**	---	---	**7**	**340**	**22**
New York	2	[2] 89	---	---	4	102	20
New Jersey	1	24	---	---	---	132	---
Pennsylvania	1	41	---	---	3	106	2
East North Central	**1**	**202**	---	---	**10**	**449**	**27**
Ohio	---	77	---	---	4	154	8
Indiana	---	6	---	---	1	8	17
Illinois	1	26	---	---	1	48	1
Michigan	---	59	---	---	2	134	1
Wisconsin	---	34	---	---	2	105	---
West North Central	---	**25**	---	**2**	---	**136**	---
Minnesota	---	2	---	---	---	29	---
Iowa	---	8	---	---	---	19	---
Missouri	---	1	---	1	---	35	---
North Dakota	---	---	---	---	---	3	---
South Dakota	---	---	---	---	---	---	---
Nebraska	---	8	---	---	---	2	---
Kansas	---	6	---	1	---	48	---
South Atlantic	**16**	**47**	---	**1**	**13**	**354**	**27**
Delaware	1	2	---	---	---	3	---
Maryland	5	13	---	---	2	41	---
District of Columbia	---	3	---	---	---	---	---
Virginia	4	10	---	---	---	84	2
West Virginia	2	---	---	---	1	62	1
North Carolina	3	11	---	---	4	112	---
South Carolina	1	2	---	---	4	20	10
Georgia	---	5	---	1	2	18	13
Florida	---	1	---	---	---	14	1
East South Central	**1**	**29**	---	**4**	**6**	**137**	**25**
Kentucky	---	7	---	---	3	10	9
Tennessee	1	16	---	---	2	76	6
Alabama	---	6	---	2	1	45	9
Mississippi	---	---	---	2	---	6	1
West South Central	---	**26**	---	**20**	**18**	**546**	**8**
Arkansas	---	5	---	11	3	77	5
Louisiana	---	3	---	1	1	2	---
Oklahoma	---	5	---	---	3	33	3
Texas	---	13	---	8	11	434	---
Mountain	**5**	**24**	**1**	**2**	**1**	**137**	---
Montana	1	1	---	---	---	15	---
Idaho	---	2	---	---	---	12	---
Wyoming	---	2	---	2	---	---	---
Colorado	3	11	---	---	---	14	---
New Mexico	---	---	---	---	---	35	---
Arizona	---	5	1	---	1	45	---
Utah	1	3	---	---	---	16	---
Nevada	---	---	---	---	---	---	---
Pacific	**1**	**110**	---	**1**	**6**	**290**	**4**
Washington	---	18	---	---	1	65	---
Oregon	---	3	---	---	---	44	---
California	1	89	---	1	5	181	4
Alaska	---	---	---	---	---	---	---
Hawaii	---	---	---	---	---	4	---

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[1] Including cases reported as salmonellosis.
[2] Including cases reported as streptococcal sore throat.

FOREIGN REPORTS

CANADA

Reported Cases of Certain Diseases—Week Ended June 3, 1950

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Brucellosis					2	2					4
Chickenpox	1		11	1	170	321	16	8	77	122	727
Diphtheria					5						5
Dysentery, bacillary					7						7
German measles			21		21	1,440	7	120	121	334	2,064
Influenza			14							1	15
Measles	1		1	1	708	1,068	98	32	52	179	2,140
Meningitis, meningococcal						2					2
Mumps			90	2	175	428	8	122	97	172	1,094
Poliomyelitis						1					1
Scarlet fever	1			2	46	36	3	9	44	8	149
Tuberculosis (all forms)	9		3	20	184	8	31	8		29	292
Typhoid and paratyphoid fever			2	4	4			1		9	20
Venereal diseases:											
Gonorrhea	10		10	10	67	36	12	17	50	47	259
Syphilis	2		9	9	53	22	1	6	2	12	116
Whooping cough			2	2	96	42	4	1	1	51	199

FINLAND

Reported Cases of Certain Diseases—April 1950

Disease	Cases	Disease	Cases
Diphtheria	54	Scarlet fever	751
Dysentery	28	Typhoid fever	13
Meningitis, meningococcal	4	Venereal diseases:	
Paratyphoid fever	73	Gonorrhea	428
Poliomyelitis	15	Syphilis	28

NORWAY

Reported Cases of Certain Diseases—March 1950

Disease	Cases	Disease	Cases
Diphtheria	12	Pneumonia (all forms)	3,438
Dysentery, unspecified	3	Poliomyelitis	4
Erysipelas	305	Rheumatic fever	127
Gastroenteritis	2,312	Scabies	937
Hepatitis, infectious	69	Scarlet fever	139
Impetigo contagiosa	1,527	Tuberculosis (all forms)	372
Influenza	3,856	Typhoid fever	1
Measles	1,167	Venereal diseases:	
Meningitis, meningococcal	9	Gonorrhea	204
Mumps	187	Syphilis	64
Paratyphoid fever	1	Whooping cough	3,675

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

The following reports include only items of unusual incidence or special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India. The total number of cases of cholera reported in the port city of Calcutta during the period January 1–May 27, 1950, was 6,509, with 3,094 deaths. The peak incidence was reported for the week ended April 22, when 777 cases with 480 deaths were recorded. For the week ended June 3, 316 cases, 132 deaths, were reported.

Pakistan. During the week ended May 20, 1950, 11 cases of cholera with 5 deaths, were reported in Dacca. For the week ended June 3, 1950, 14 cases, 7 deaths, were reported in Chittagong.

Plague

Belgian Congo. Plague has been reported in Belgian Congo as follows: In Costermansville Province, on May 26, 1950, one fatal case at Malonga, a village northwest of Lubero; in Stanleyville Province, on May 27, 1950, one case at Djaji, on June 3, one fatal case at Wasa. Both of these villages are located northeast of Blukwa.

Union of South Africa. During the week ended May 13, 1950, one case of plague was reported in Luckhoff Municipal Area, Orange Free State.

Smallpox

Indonesia (Java). Smallpox has been reported in Surabaya as follows: Week ended May 13, 1950, 149 cases, 32 deaths; week ended May 27, 191 cases, 62 deaths.

Republic of Korea. Smallpox has been reported in the port of Ryusu as follows: Weeks ended April 8, 1950, 13 cases; April 15, 12 cases; April 29, 8 cases; May 6, 25 cases; May 13, 2 cases

Typhus Fever

Afghanistan. During the month of April 1950, 405 cases of typhus fever were reported in Afghanistan.

Egypt. During the week ended May 20, 1950, 12 cases of typhus fever were reported in Egypt, including 1 in Cairo. For the week ended May 27, 9 cases were reported, 5 of which occurred in Cairo.

Republic of Korea. During the week ended April 8, 1950, 9 cases of typhus fever were reported in Inchon.

Yellow Fever

Peru. Reports of yellow fever have been received as follows: In Cuzco Department, on February 15, 1950, one death, and on February 23, one death, both at Quincemil; in Huanuco Department, on April 25, one case at Tingo Maria, Rupa-Rupa District.

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The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, Public Health Service, Washington 25, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington 25, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

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Public Health Reports

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Stability of Rh Factor in Mailed Samples

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Public Health Reports

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Influence of Type and Concentration of Antitoxin on the *in vitro* Toxigenicity Test for *C. diphtheriae*

By VICTOR J. FREEMAN, M. D.*

The *in vitro* method for determining the toxigenicity of *Corynebacterium diphtheriae* cultures was introduced in 1948 simultaneously by Elek (*1*) in Britain and Ouchterlony (*2*) in Sweden. Both authors have elaborated on their original descriptions (*3, 4, 5*). King et al. (*6*) in this country reported favorably on Elek's test and introduced several modifications.

Many variables are concerned in the *in vitro* reaction. Elek's recent paper (*3*) described the effect of various changes in the composition of the medium. He showed that the brand of lactic acid and the type of peptone used may materially affect the toxin-antitoxin reaction. In the same report, Elek demonstrated that the presence of natural diphtheria antitoxin in serum added for medium enrichment can interfere with production of the specific *in vitro* arrowhead precipitate. This result would seem to justify the exercise of caution in the use of human serum recommended by Carter and Wilson (*7*). Although the latter authors do not record any discrepancies in their results, King et al. (*6*) found human serum inferior to horse, rabbit, and sheep sera.

Before the *in vitro* toxigenicity test can be adopted as a routine public health laboratory procedure, another variable must be considered, namely, the specific diphtheria antitoxin used to soak the filter paper strip. The commercial antitoxins which are available were designed for therapeutic use, and the biologic firms manufacturing them make no claim to an antigenically monovalent product. As a consequence, the content of antibody other than antitoxin may be expected to vary in the different products. Such variation is indicated by the data recorded below.

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Materials and Methods

Field cultures that had been classified as *C. diphtheriae* according to the criteria of Anderson et al. (*8*) were used. In the experiments in tables 2 and 3, culture No. 1 was a gravis strain, No. 7 was a diphtheroid, and Nos. 2 to 6 and Nos. 8 to 11 were atypical mitis strains. The *in vitro* method followed was that of Elek (*1*) as modified by King et al. (*6*). The pH of the medium after sterilization and prior to addition of the serum was adjusted to 7.8. Sheep serum was employed as the enriching agent. The commercial antitoxin was diluted to 500 units per ml. (on the basis of the labelled unitage) in 0.85 percent NaCl solution. The test plates were inoculated from 24-hour brain-heart infusion broth cultures, and guinea pig intracutaneous toxigenicity tests were conducted with the same broth culture material. The plates were incubated at 37° C. for 3 days. Readings were made at 24-hour intervals during incubation, with a final reading at 72 hours. The plates were then kept at room temperature or in the refrigerator for an additional 7 days following the final reading. Although the reactions increased progressively after the third day, there were no significant qualitative changes.

Experimental

Production of Arrowhead Precipitates by Avirulent Strains

Previous investigations (*3, 6, 7*) have established complete correlation between positive *in vivo* and *in vitro* toxigenicity tests when the tests are read within 48 to 72 hours. In the course of checking the toxicity of our *C. diphtheriae* culture collection by the *in vitro* method, a number of arrowhead precipitates were recorded for the plate test within 72 hours on strains that previously were found to be avirulent[1] in animals (table 1).

These *in vitro* positive, *in vivo* negative strains, which were in all respects *C. diphtheriae*-like except for animal toxigenicity, were isolated from clinically diagnosed diphtheria patients from whom no toxigenic cultures could be obtained. Repeated virulence tests with such strains in guinea pigs, by intracutaneous, subcutaneous, and intraperitoneal routes, and the intracutaneous route in rabbits were interpreted as negative, even though occasional unprotected skin reactions were slightly greater than control reactions. Confirmation of the avirulence of these cultures was obtained from two independent laboratories.[2] Such cultures would seem to be very similar to those described by Frobisher et al. (*9*) in their study of the virulence of nontoxigenic *C. diphtheriae* strains.

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[1] The terms virulent and avirulent are used only in reference to the property of toxigenicity in animals.

[2] Public Health Laboratory, Seattle, and Division of Laboratories, California State Department of Public Health

Table 1. *Comparison of in vitro and in vivo toxigenicity tests on field cultures from diphtheria cases and contacts*

Cultural classification	*In vitro* [1]	*In vivo* [2]	Number of strains
C. diphtheriae	+	+	143
	0	0	10
	+	0	[3] 11
	0	+	[4] 10
Diphtheroids	0	0	33
Non-Corynebacterium	0	0	10

[1] *In vitro* toxigenicity plate test as described in text.

[2] Intracutaneous guinea pig virulence test.

[3] 4 of these cultures were typed atypical gravis and the remaining 7, atypical mitis. These strains are represented in tables 2 and 3 by culture numbers 2, 3, 5, 6, 8 and 10.

[4] All of these strains were intermedius in type. It was therefore assumed that the negative *in vitro* results were due to traces of hemoglobin in the sheep serum—see King et al. (*6*).

The positive *in vitro* reactions recorded for these avirulent strains were reproduced repeatedly, always within the first 72 hours of incubation. The precipitates produced by the avirulent cultures were usually not as well defined as the primary arrowhead precipitates of typical virulent cultures (figs. 1 and 2). Such reactions unquestionably are the same as the "false toxicity reactions" of Ouchterlony (*4,5*) and the "secondary lines" of Elek (*3*). In reference to the secondary precipitates, Elek warned: "To avoid confusion the plate test must not be read later than 48 hours." In our experience, such a time restriction has been undesirable. *In vivo* positive cultures not infrequently showed delayed production of the toxin-antitoxin precipitate. Since it would be preferable to allow slow toxin-producing strains ample incubation time, methods of completely eliminating the secondary reactions were investigated.

Comparison of Different Antitoxin Products

If the secondary precipitates are the result of other antigen-antibody interactions, one would not necessarily expect to get identical results when using different brands of commercial antitoxin. To determine whether or not variation did occur, five different brands of commercial antitoxin were purchased and diluted to 500 units per ml.[3] The same lots of medium and sheep serum were used throughout, and the same broth cultures were employed to inoculate all five plates in the series. The results are recorded in table 2.

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[3] In the text following, A=Eli Lilly & Co brand of antitoxin, B=E R Squibb & Sons, C=Cutter Laboratories; D=Parke Davis & Co. and E=Lederle Laboratories brand The author wishes to emphasize that, in the present state of our knowledge concerning secondary *in vitro* precipitates, the comparison of different antitoxin brands is in no way indicative of the superiority of any one product over the others.

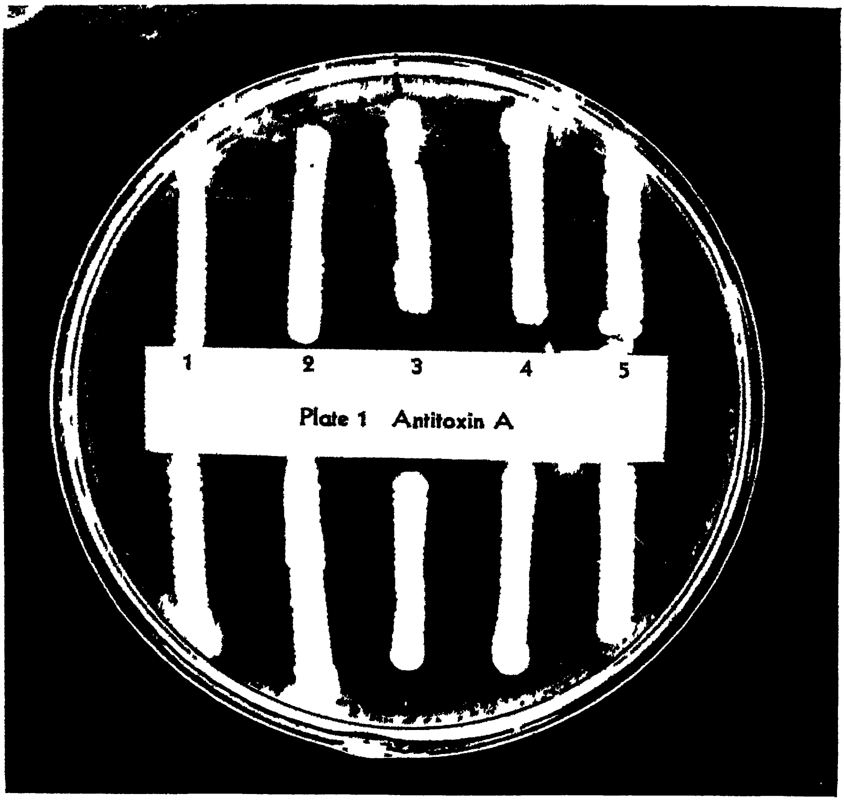

Figure 1. Culture 1 was avirulent and 2–5 were virulent when tested on animals. Note the presence and fusion of primary toxin-antitoxin lines in cultures 2–5 and their absence in culture 1. All the cultures have produced secondary lines.

Table 2. *Effect of different commercial antitoxins on the occurrence of primary and secondary precipitates in the in vitro toxigenicity test*

Culture No.	Animal test	Brand of commercial antitoxin (500 units/ml.)				
		A	B	C	D	E
1	Positive	[1] 4+s	4+	4+	4+	4+
2	Negative	2+	0	1+	0	0
3	do	2+	0	2+	±	0
4	do	0	0	0	0	0
5	do	2+	0	2+	0	0
6	do	1+	0	1+	0	0
7	do	0	0	0	0	0
8	do	1+	0	0	0	0
9	Positive	4+s	4+	4+s	2+s	3+
10	Negative	1+	0	1+	0	0

[1] 0 to 4+ indicates the size and clarity of the linear arrowhead precipitates; "s" indicates appearance of secondary lines in addition to a primary precipitate. Plates read after 72 hours at 37° C.

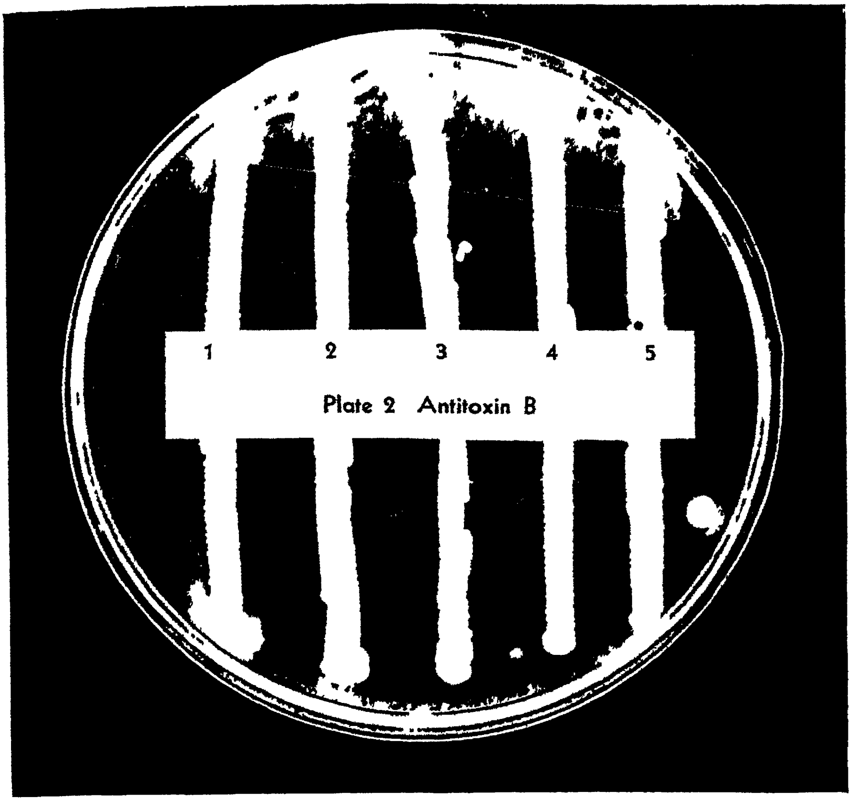

Figure 2. Plates 1 and 2 inoculated at the same time with the same cultures. Only the brand of antitoxin has been changed. Only primary lines are now visible, and therefore culture 1 shows complete absence of linear precipitates. Both plates incubated 72 hours at 37° C. (Photographs courtesy G. W. Reis, Department of Medical Photography, University of Washington.)

Commercial serum A was the brand which had been used originally. Serum C is remarkably similar to A in its reactions. Brands B and E did not show any secondary lines. Antitoxin D showed a slight arrowhead precipitate with an avirulent culture. The typical virulent cultures showed characteristic primary linear precipitates with all five brands of antitoxin.

Consideration was given to the possibility that these differences in commercial antitoxins might be due to a variation in concentration of the serum rather than to a qualitative difference in composition. Such a variation could result from inclusion of more antitoxin than the amount indicated on the label in order to allow for deterioration. As there is no theoretical limit to this excess, the products might be expected to vary in true antitoxin concentration. Rough flocculation tests were conducted according to the method of Glenny and Okell (*10*). All five products were found to have an antitoxin concentration within the range of 500 to 800 antitoxic units per ml. when diluted to 500 units per ml. as determined by the label. Antitoxin C had the lowest concentration and antitoxin E, the highest. Since serum C produced secondary reactions and serum E did not, it would seem that the differences in reaction produced by the five commercial antisera were not the result of variation in serum concentration, but rather of variation in serum constitution.

Effect of Diluting Antitoxin

Ouchterlony (*4*, *5*) had noted that the false toxicity reactions produced by his technique could be reduced appreciably by decreasing the concentration of antitoxin. To determine the effect of dilution on the five different products, all samples were diluted to a concentration of 50 units per ml. and the tests repeated with seven of the cultures used in the previous experiment. The results are recorded in table 3.

Table 3. *Effect of dilution of antitoxin on occurrence of primary and secondary precipitates in the in vitro toxigenicity test*

Culture No	Animal test	Brand of commercial antitoxin (50 units/ml)				
		A	B	C	D	E
1	Positive	[1] 4+	3+	2+	3+	3+
2	Negative	0	0	0	0	0
4	do	0	0	0	0	0
5	do	0	0	0	0	0
6	do	0	0	0	0	0
8	do	0	0	0	0	0
10	do	0	0	0	0	0
11	Positive	3+	2+	2+	2+	2+

[1] 0 to 4+ indicates the size and clarity of the linear arrowhead precipitates There were no secondary lines associated with the positive reactions recorded above. Plates read after 72 hours at 37° C.

Dilution of all commercial antitoxins tested caused the secondary lines to disappear, but at the same time allowed the primary precipitates to remain evident. In another experiment, the concentration of antitoxin A was decreased from 2,000 units per ml. to 62.5 units per ml. by serial doubling dilution. The secondary reactions of both virulent and avirulent cultures progressively disappeared in direct proportion to the decreasing antitoxin concentration.

Discussion

Before the *in vitro* toxigenicity test for *C. diphtheriae* can be accepted as a routine public health laboratory procedure, all known variables must be adequately controlled. In addition, the significance of all possible reactions should be understood. In the animal toxigenicity test (unfortunately known as the "virulence" test in common laboratory parlance) a reaction is read as positive if the characteristic lesion which appears in the absence of specific antitoxin is prevented in its presence. The occurrence in commercial antitoxin of other components reacting specifically with the diphtheria bacillus or its products presumably does not interfere with the interpretation of such toxicity reactions. However, in the *in vitro* test, where the visible interaction of antigen and antibody is the basis for a positive result, discrepancies can readily arise.

As the described experiments have demonstrated, the secondary reactions can be avoided either by the selection of a commercial antitoxin that fails to produce such precipitates or by suitable dilution of an antitoxin that does produce them. If the latter method is adopted, the diluted serum must be checked carefully with control positive and negative cultures.

Although only single lots of five commercial antisera were tested, the evidence obtained would seem to justify further investigation with the objective of providing a standard purified antitoxin for laboratory use only. If the secondary reactions are proved to be antigenic, a purified antitoxin could be prepared either by absorption of the crude product with avirulent culture material or by use of a purified toxin as the stimulating antigen in the process of antitoxin production. Lawrence and Pappenheimer (*12*) already have demonstrated the feasibility of producing a diphtheria toxin free of an atoxic antigenic component which they called the P-fraction. Whether or not this P-fraction and the secondary precipitates of the *in vitro* test are related remains to be established.

Although secondary reactions may be regarded as a nuisance to laboratory personnel required to report on the virulence of field cultures, the strains producing them present an extremely interesting relationship to typical toxigenic *C. diphtheriae* cultures. Diphtheria investigators have long argued the status of avirulent diphtheria organisms. Because there is no good evidence that these strains are able to become toxigenic for animals, their public health significance remains obscure. Frobisher et al. (*9, 11*) have attempted to demonstrate diphtheria immunizing powers of avirulent cultures when tested in mice and rabbits. Although not conclusive, their results certainly warrant further investigations. Observations with the *in vitro* technique may contribute materially to such research.

Summary

1. The production of arrowhead precipitates by avirulent *C. diphtheriae* cultures in less than 72 hours on *in vitro* toxigenicity test plates were described.

2. Five different brands of commercial antitoxin were compared in the *in vitro* test to determine the variability of production of secondary precipitates. All five produced primary lines with virulent cultures, but two failed entirely to show the secondary reactions.

3. Dilution of the antitoxin used in the plate test resulted in the disappearance of secondary precipitates produced by both virulent and avirulent cultures. The characteristic primary precipitates persisted at a dilution of 50 units per ml.

4. The production of secondary lines by the commercial antitoxin products showed no correlation with the true antitoxin concentration of the different brands, a fact which was interpreted as signifying a qualitative difference in the components responsible for the secondary reactions.

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A Study of Certain Factors Affecting the Agglutination Test for Brucellosis

By JOSEPH H. SCHUBERT, Ph. D., and JOHN F. HERNDON, B. A.*

The agglutination test for brucellosis is much used as a diagnostic procedure and should be as fully standardized as possible. Comparative studies by other workers have revealed considerable divergence in methods and results of tests in different laboratories (*1*). In view of this fact and of the data obtained from a questionnaire distributed by the National Research Council Committee on Brucellosis (*2*), it has become obvious that further efforts to evaluate these procedures and standardize the test are desirable.

The present study was undertaken to compare procedures now in use for the agglutination test for brucellosis and to evaluate various modifications of technical factors in the test so that a standard and reliable procedure could be established.

Experimental

A collection of positive *Brucella* sera was obtained from Dr. B. N. Carle of the National Institutes of Health, Dr. D. L. Lichty of Wisconsin, and Dr. M. Ruiz Castaneda of Mexico, and several State health laboratories. It was decided to use the maximum titer obtainable as the criterion of sensitivity for each of the test methods examined. The maximum titer of the serum (as given in this report) represents the highest dilution of serum which gave complete agglutination of the antigen, accompanied by a perfectly clear supernatant fluid.

The factors involved in the agglutination reaction which were investigated in different parts of the study were:

1. Antigen preparation and incubation conditions.
2. Antigen strain and media used for antigen production.
3. Effect of pH on the agglutination titer.

Materials and Methods

Part I: Antigen Preparation and Incubation Conditions

This part of the investigation involved a study of 105 sera—70 from cows, 5 from goats, and 7 from persons. A strain of *Brucella* was iso[illegible] from each donor of serum, but data on the strain isolated were not available.

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The antigen used as a preliminary basis for comparison was made by the Bureau of Animal Industry, Beltsville, Md., from *Brucella abortus*, strain 1119–3, and was tested in accordance with methods developed by the Bureau of Animal Industry (*3*) for the *Brucella* agglutination test in test tubes.

In preparing our own antigen, the organisms of this strain were harvested in phenolized physiological saline and examined for purity. The suspension was filtered through a thick pad of sterile, nonabsorbent cotton into a suction flask with the aid of a vacuum. The filtered suspension was heated in flowing steam for 25 minutes, then it was centrifuged and the supernatant fluid discarded. This procedure departs from the Bureau of Animal Industry method in that the antigen suspension is centrifuged before heating. The cells were resuspended by vigorous agitation and diluted to obtain nine different antigen densities. The density of the antigen for each test was separately adjusted by setting up the McFarland nephelometer standards (also known as barium sulfate standards). The standards were always prepared immediately before using. The degrees of turbidity were read by means of the Lumetron photoelectric colorimeter.

Tubes used in the agglutination studies measured 13 by 100 mm. Twofold dilutions of serum of from 1 in 25 to 1 in 12,800 were prepared in the tubes with the diluent.

In a series of preliminary tests, nine different methods of antigen preparation and four different incubation conditions were tested with 20 sera.

The tests were read at 24 and 48 hours, parallel series being incubated in the water bath at 37° C. and at 52° C., in the dry incubator at 37° C., and in the water bath at 52° C. for 4 hours followed by storage in the icebox at 4° to 6° C. to complete the incubation. The water baths were of the gable-covered type.

The nine antigens and procedures were as follows:

Test A. This was carried out with antigen obtained from the Bureau of Animal Industry and tested according to their method (*3*). The antigen concentration was equivalent to a barium sulfate standard tube No. 1. Dilutions of serum were made by adding 4 ml. of antigen to the first tube and 2 ml. to nine other tubes. Sixteen-hundredths milliliter of serum was added to the first tube, yielding a dilution of 1: 25, and this was further diluted by mixing 2 ml. in series with the antigen in the other tubes.

Test B. The antigen used in test B and all following tests was prepared in this laboratory as described above. The procedure for test B was the same as for test A. The antigen density was equal to a barium sulfate standard No. 1.

Test C. The antigen density for test C was equal to a barium sulfate standard No. 2. In this procedure, 2 ml. of saline was placed in the first tube and 1 ml. of saline in the remaining nine tubes. Sixteen-hundredths milliliter of serum was added to tube one and then serially diluted in the usual manner. One milliter of antigen was then added to each of the 10 tubes of diluted serum.

Test D. Antigen for test D was adjusted to a barium sulfate standard of 1.5 and tested as described in test A in which the antigen was used as the diluent.

Test E. Antigen for this test was adjusted to a barium sulphate standard No. 3 and tested as described in test C, using saline as the diluent.

Test F. The antigen for test F was adjusted to a barium sulfate standard No. 3 and tested as described in test A in which the antigen was used as the diluent.

Test G. In test G the antigen was adjusted to a barium sulfate standard No. 6. Serum was tested as in test C in which saline was used as the diluent.

Test H. In this test, the antigen was adjusted to a barium sulfate standard No. 1 and tested as described in test C in which saline was used as the diluent.

Test I. In this, the last test, the antigen was adjusted to a barium sulfate standard No. 1.5, and the procedure was as in test C in which the saline is the diluent of the serum.

The initial density of antigen in tests C, E, G, H, and I, was halved when the antigen was added to the serum-saline mixtures.

Part II: Antigen Strain and Media Used for Antigen Production

Three cultures of *Br. abortus:* strain 1119–3 from the Bureau of Animal Industry, strain 1336 sent by Dr. I. F. Huddleson, and strain 456 from the National Institutes of Health were compared. For comparative purposes, each was cultivated for antigen on potato-infusion 3 percent agar (the Bureau of Animal Industry Medium) and on tryptose 3 percent agar. The formulas follow:

Potato-Infusion 3 percent Agar

Potato infusion	1000 ml.
Agar	30 gm.
Bacto-peptone or equivalent	10 gm.
Beef extract, Liebig's or equivalent	5 gm.
Sodium chloride U. S. P	5 gm.
Glycerine U. S. P	20 ml.
Dextrose U. S. P	10 gm.
Final pH	6.4–6.8

Tryptose 3 percent Agar

Bacto-tryptose	20 gm.
Bacto-dextrose	1 gm.
Sodium chloride	5 gm.
Bacto-agar	30 gm.
Final pH	6.9

The resulting six antigens were tested with 83 sera from known cases of brucellosis. The strains and the media used were the only variables compared. The method of test C as described above, with incubation in the water bath at 52° C., was used in this comparison.

Part III: Effect of pH on the Agglutination Titer

In this part of the study, Clark buffers (*4*), pH 5, 6, 7, 8, and 9, were prepared as diluent for the serum. Sera from 44 known cases [illegible] were tested. The technique of test C was used in parallel series of tests. In one series of tests, the sera were diluted with isotonic saline solution. In the other series, the sera were diluted with the buffered saline solutions which were adjusted so that the total salt concentrations of the buffered solutions were as nearly isotonic as possible. A determination of the pH of 1 ml. of each buffer solution when diluted with 1 ml. of antigen showed that pH 5.0, 6.0, 7.0, 8.0, and 9.0 changed to pH 4.9, 5.8, 6.8, 7.7, and 8.6, respectively. The pH of saline, which was 6.0, became 6.2 when diluted with antigen. The pH of the antigen was 6.7. The agglutination test was studied with these final pH values.

Method of Reading All Tests and Noting Results

The tubes were held up to a fluorescent light and read against a dark background. A positive agglutination was denoted by agglutinated cells in a sparkling, clear, supernatant liquid. An incomplete agglutination was noted when agglutinated cells were viewed in a cloudy supernatant liquid. A negative result was obtained when no agglutination was visible.

Results—Part I

The *Brucella* agglutination titers obtained with tests A–G, using 20 sera in preliminary studies, were tabulated. Tests H and I were compared with test C separately and are discussed later. The number of times any one test gave the highest titer when compared with the other six tests was noted. The summarized data on the first 20 specimens showed clearly that, irrespective of the times or temperature of incubation, test C gave better results than any of the other six tests. Tests B and E were better in the order named than tests A, D, G, or F. The results also showed that incubation at 52° C. for 4 hours, followed by refrigeration, generally yielded lower titers than continual incubation at 52° C. There was little choice between 37° C. dry, and 37° C. water bath incubation. However, the 37° C. dry incubation is a variable incubation condition and the fluid in the tubes reach incubator temperature slowly, depending on the incubator load and other factors. Both the 37° C. dry incubation, and incubation at 52° C. for 4 hours, followed by refrigeration, as well as tests A, D. F, and G, were discontinued.

The comparison of tests B, C, and E, using incubation at 37° C. and 52° C. in the water bath, was continued until 105 specimens were tested. The results again were analyzed and numbers of sera yielding higher, equal, or lower titers with each antigen were computed. Due to the complexity of the data, only the summarized results are given. The results revealed that, with test C in 24 hours, 33 sera yielded higher titers at 52° C. than at 27° C., while 50 sera gave equal titers at both temperatures, and 22 sera yielded lower titers at 52° C. At the 48-hour interval, 31 sera yielded higher titers at 52° C., while 53 gave equal titers at both temperatures, and 21 sera gave lower titers at 52° C. Thus, there were no significant differences between the results read after 48 hours and those obtained in 24 hours, and no marked influence of temperature, although 52° C. seemed to favor higher titers. In addition, examination of the tests earlier than 24 hours showed that the agglutination process was proceeding faster in the 52° C. water bath. Tests B and E yielded concordant results with generally lower titers. Accordingly, all further tests were carried out in the water bath at 52° C., and readings were recorded after 24 and 48 hours. However, only readings at 24 hours are discussed in this report.

An analysis of results obtained with tests B, C, and E incubated at 52° C. for 24 hours showed that test C gave 62 higher titers, 41 equal titers, and 2 lower titers than B; that test C gave 55 higher titers, 44 equal titers, and 6 lower titers than E. Test E gave 29 higher titers, 65 equal titers, and 11 lower titers than B. These figures clearly indicate the superiority of test C over E or B. Test E was better than test B.

Tests H and I were set up for the purpose of evaluating antigen densities lower than those commonly in use. These were compared with test C on a total of 37 specimens using water-bath incubation at 52° C. for 24 hours.

An analysis of these results showed that test H gave 31 higher, 5 equal, and 1 lower titers than test C; and 20 higher titers, 12 equal, and 5 lower titers when compared with test I. Test I gave 10 higher titers, 25 equal, and 2 lower titers than test C. The results indicate that, with these 37 specimens, test H was superior to I and C. Test I was better than test C. This suggests that the more dilute the antigen, within range of good visibility, the more sensitive the test.

Results—Part II

The effectiveness of the three strains of *Br. abortus* described under "Materials and Methods" was compared when cultivated on potato-infusion agar, and on tryptose agar. A total of 83 positive sera, of which 24 were bovine, 33 human, 12 simian, 13 caprine, and 1 porcine, were tested in this comparison.

Readings were made after 24 hours incubation in the water bath at 52° C. The antigens were prepared and tested according to test C.

The results in the table show that *Brucella* strain 1336 cultivated on potato agar was a better antigen than strain 1119–3 cultivated on either potato or tryptose agar. Strain 1119–3 was inferior to strains 1336 or 456 irrespective of the media used. Higher titers were

Comparison of three antigen strains cultivated on potato and tryptose agar, tested with 83 sera; 21-hour reading

Of 83 sera tested with antigen	Those noted below gave titers			When compared with antigen
	Higher	Equal	Lower	
1119–3 P*	26	50	7	1119–3 T
1119–3 P	3	57	23	1336 P
1119–3 P	8	59	16	456 P
1336 P	22	49	12	456 P
1336 P	27	45	11	1336 T
1119–3 T**	7	56	20	1336 T
1119–3 T	3	33	47	456 T
1336 T	3	43	37	456 T
456 T	25	53	11	456 P
456 T	30	35	18	1336 P

* Potato-infusion agar.
** Tryptose agar.

obtained with strain 1119–3 cultivated on potato-infusion agar than when cultivated on tryptose agar. Strain 456 cultivated on tryptose agar gave more higher titers than strains 1336 and 1119–3 cultivated on tryptose or potato-infusion agar.

Results—Part III

The results obtained with diluents buffered at pH 5 and 6 were inferior to those obtained at pH 7. pH 5, compared with pH 7, gave 2 higher, 14 equal, and 28 lower titers. A comparison of pH 6 with pH 7 showed 8 higher, 24 equal, and 12 lower titers with pH 6. The results obtained with pH 8 and 9 were also inferior to pH 7. pH 9, compared with pH 7, gave 2 higher, 31 equal, 11 lower titers. A comparison of pH 8 with pH 7 showed 5 higher, 31 equal, and 8 lower titers with pH 8. The results with saline (pH after addition of antigen was 6.2) were equal to those with pH 6.0 buffer; in this case, 10 higher, 24 equal, and 10 lower titers were obtained with saline. These data indicate that the pH of the diluent should be near neutrality.

Discussion

The results show that antigen for test B, made in this laboratory, was more sensitive than the antigen for test A prepared by the Bureau of Animal Industry in Beltsville, Md. It is possible that heating the antigen before centrifugation increased the sensitivity of the preparation.

Comparison of tests in which the antigen was the diluent—tests B, D, and F—show that lower titers were obtained than when saline was the diluent—tests C, E, and G—irrespective of the antigen density. This suggests that serum should be diluted with saline and not with the antigen.

Test H, with an antigen density equivalent to McFarland No. 1, was superior to heavier antigen densities. This was especially true with low-titer sera. Tests made with antigens having densities lower than McFarland No. 1 were not satisfactory because the antigen was too dilute to read.

The McFarland nephelometer or barium sulfate standards may be a source of considerable error. Readings made with the Lumetron photoelectric colorimeter showed decreasing translucence with aging of the standards. This was not detected easily by the unaided eye. However, changes in translucence were not observed to occur in bacterial suspensions.

Most of the serum specimens exhibited their maximum titer in 24 hours. Although 48-hour results are not recorded, an occasional specimen required incubation for 48 hours before the agglutination was complete.

The results found indicate that continual incubation at 52° C. was superior to incubation for 4 hours followed by storage in the refrigerator for the remaining 20 hours. The results obtained by Henry and Traum (*5*) also showed that continual incubation was superior to incubation and storage in the icebox. However, they made their tests at 37° C. instead of 52° C.

According to the results obtained in this study, *Brucella* strain 456, obtained from the National Institutes of Health, was the best antigen when cultivated on tryptose agar. Strains 1119–3 and 1336 were better antigens when cultivated on potato-infusion agar than when cultivated on tryptose agar.

The agglutination did not proceed well on the acid or alkaline side of neutrality. Saline made with neutral distilled water or buffered at pH 7.0 would be preferable for the agglutination test.

Summary and Conclusion

Certain factors affecting the *Brucella* agglutination test in tubes were studied on 269 sera from known cases of brucellosis. Under the experimental conditions described in this report:

1. Antigen density equivalent to barium sulfate standard No. 1 gave the highest titers.

2. The dilution of serum with saline is preferable to dilution with antigen.

3. *Br. abortus,* strain 456, obtained from the National Institutes of Health and cultivated on tryptose agar gave more higher titers than did strain 1119–3 obtained from the Bureau of Animal Industry, or 1336 obtained from Dr. I. F. Huddleson and cultivated on either tryptose or potato agar.

4. Better results were obtained when the agglutination tests were incubated continuously in the water bath at 52° C. for 24 hours than when incubated at 37° C. or when refrigerated.

5. Higher agglutinin titers are exhibited by a few sera if readings are made at 48 hours rather than 24 hours.

6. The agglutination reaction operates best near neutrality.

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(*2*) Summary of the questionnaire distributed by the Committee on Brucellosis of the National Research Council. Personal Communication, 1948.

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(*4*) Clark, W. M.: The Determination of Hydrogen-Ions. Ed. 3. Williams and Wilkins Co, Baltimore, 1928.

(*5*) Henry, B. S and Traum, J.: A comparison of factors influencing the agglutination test for *Brucella abortus* J. Infect. Diseases **47:** 367–379 (1930).

Stability of the Rh Factor in Mailed Samples

By Clifford I. Argall*

When the Utah State Department of Health's prenatal Rh typing program began in 1947, one of the major unanswered problems concerned the reliability of mailed samples for blood grouping. No satisfactory evidence was available, but other laboratories had indicated that such specimens were probably satisfactory. It was decided that the program should be started without delay, but that a controlled investigation would be made at a later date to determine exactly what percentage of error could be expected as a result of any adverse conditions in the ordinary mail. The data obtained may be of value to other laboratories engaged in or planning similar programs.

The 1,417 specimens received in this laboratory for routine prenatal testing were used in this study, 1,099 being Rh positive and 318 Rh negative. (The term, Rh positive, is used for erythrocytes containing the D antigen, and Rh negative, for those lacking it.) All were in excellent condition upon arrival. They were centrifuged at 4,200 rpm for 5 minutes and the serum poured off for use in the serological test for syphilis. Two percent suspensions of the cells were made in 0.85 percent saline, washed, resuspended, and the Rh type determined by the tube method. The slide test was also done, using a heavy cell suspension direct from the clot. After the results had been recorded, the vials containing the clots were packed and mailed to our branch laboratory at Cedar City, Utah, a distance of 263 miles. The time in transit varied from 1½ to 3 days. Without being unwrapped, they were returned to us by mail. The Rh typing was repeated, but only the tube test was used. So many samples showed such an advanced state of hemolysis that it was impossible to get a cell concentration heavy enough to obtain reliable results with the slide test.

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Only one of the 1,417 samples studied showed a discrepancy in typing. This lone specimen, typed weakly positive originally, was Rh negative when repeated. Exactly what factor or factors influenced this result cannot, of course, be determined. The only consideration in this study was the over-all effect upon the Rh factor of varying conditions in the mail, so no specific cause can be assigned. It would seem very likely that an intrinsic weakness in the antigenic structure of those particular erythrocytes or an actual laboratory error in the typing would be the answer, since none of the other samples were affected in any way by the same conditions. The incidence of error, 0.07 percent, is almost the same as for our routine work, 0.09 percent, and does not represent any significant difference.

In order to show that climatic conditions produce no specific effect, 797 of the samples tested were sent during the coldest months of the year, January and February, and the remaining 620, during the last of June and part of July. The only discordant result occurred in the former group. Neither winter cold nor summer heat seemed to produce any effect on the antigen, but as might be expected, the amount of hemolysis was sharply increased during the hot months (table 1).

Since hemolysis has been frequently mentioned as a possible cause for unreliable typings, the specimens were divided very roughly into four groups (see table 1):

Very badly hemolyzed. Clots were shiny and irridescent. Very thin cell suspensions could be made, but only with difficulty. Practically all showed the purplish discoloration of bacterial contamination.

Badly hemolyzed. All suspensions could be made fairly easily, but when washed, the supernatant was deep red in color.

Hemolyzed. Supernatant from washing was a light, but definite red.

Slightly hemolyzed. Supernatant from washing showed only a faint pink.

No correlation whatever between hemolysis and inaccuracy in typing could be observed. In fact, the single erroneous result came in the hemolyzed group.

No attempt was made to identify the contaminating organisms in those specimens showing obvious growth. In this study, bacteria had no effect on the results, although it is possible that some bacteria might be able to destroy the antigen.

Table 1. *Classification of mailed samples on the basis of hemolysis*

Degree of hemolysis	Winter		Summer		Total
	Number of samples	Percent	Number of samples	Percent	
Very badly hemolyzed	223	28.0	267	43.0	490
Badly hemolyzed	166	20.7	201	32.4	367
Hemolyzed	264	33.2	95	15.2	359
Slightly hemolyzed	144	18.1	57	9.1	201

We were rather surprised to find that the age of the cells made no difference, up to the limits of this study. Table 2 gives the age of the cells used, calculated as the number of days intervening between the drawing of the blood and the final typing. Here again, the error occurred in an intermediate group—5 days.

Table 2. *Comparison of age of cells in experiment with those of routine samples received by this laboratory*

Age (in days)	Experimental samples	Routine samples
1	0	546
2	0	114
3	54	20
4	657	16
5	263	4
6	195	3
7	57	3
8	123	2
9 or more	68	1

Discussion

If the conditions in the mail were to produce any change in the Rh antigen leading to unreliable results, they should have been revealed by this study. The specimens were treated far more roughly and were much older than the ones we receive routinely. They were shipped over a greater total distance (526 miles) than any ordinary sample received by us. Seventy percent of the specimens had already been in the mail once en route to the State laboratory. In spite of centrifugation, bacterial contamination, removal of serum, age, and exposure to varying degrees of heat and cold, the original results could be reproduced to an extremely high degree of accuracy.

The value of this experiment has been demonstrated in the work of the past year. Out of a total of 27,858 specimens received, 512, or 1.84 percent, were so hemolyzed that previously we would not have attempted the blood grouping. Actually, we were able to type 314 of them, leaving only 0.7 percent of the total to be discarded. With these, repeated attempts to make cell suspensions ended only with a deeply colored supernatant and a little cell debris at the bottom of the tube. No intact cells could be recovered from the clot.

Some caution is necessary in dealing with hemolyzed blood. It is usually impossible to gage the cell suspensions to 2 percent. We make them as heavy as possible in order to get enough uninjured cells for reading the result. If a sufficient number of whole cells can be obtained to get a typical sedimentation pattern in the tube test, the cell debris does not interfere. When a microscopic reading is necessary, the cellular fragments may, at a casual glance, simulate agglutination. Careful viewing is necessary to distinguish between debris and agglutinated cells.

Various preservatives, such as Alsever's solution, ACD mixture, and Rous-Turner solution, have been suggested for keeping the cells intact over long periods of time. These may be of value in isolated instances, but the added cost of providing separate mailing containers reduces their usefulness. Clotted blood is just as effective and can be used for the syphilis test, Rh typing, and titration, while preserved blood is limited to blood grouping.

Summary

A series of cells of known Rh type were sent a distance of 526 miles through the mail. One false negative result was obtained, an error of 0.07 percent. Age of the cells, degree of hemolysis, climatic conditions, and hazards of unknown nature in the mail did not affect the accuracy of the Rh typing.

Incidence of Disease

No health department, State or local, can effectively prevent or control disease without knowledge of when, where and under what conditions cases are occurring

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UNITED STATES

Reports from States for Week Ended June 24, 1950

For the current week in the Nation, reported cases of acute poliomyelitis increased over the number reported the preceding week, 236 to 336. For the corresponding week last year, 409 cases were reported. The States reporting the largest number of cases for the current week were: Texas (107), California (33), Oklahoma (23), New York (17), New Jersey (16), and South Carolina (15).

The cumulative total number of poliomyelitis cases for the calendar year is misleading because the calendar year does not correspond with the disease year. A calendar year covers January through December while the disease year for poliomyelitis covers March through February. Therefore, the 1950 calendar year includes the declining phase

Comparative Data for Cases of Specified Reportable Diseases: United States

[Numbers after diseases are International List numbers, 1948 revision]

Disease	Total for week ended		5-year median 1945–49	Seasonal low week	Cumulative total since seasonal low week		5-year median 1944–45 through 1948–49	Cumulative total for calendar year		5-year median 1945–49
	June 24, 1950	June 25, 1949			1949–50	1948–49		1950	1949	
Anthrax (062)	1	1	(1)	(1)	(1)	(1)	(1)	20	31	(1)
Diphtheria (055)	44	82	145	27th	[2] 7,280	8,730	13,582	[2] 3,000	3,616	6,016
Acute infectious encephalitis (082)	27	11	9	(1)	(1)	(1)	(1)	314	257	221
Influenza (480–483)	619	572	631	30th	273,998	109,944	179,378	243,408	73,674	135,820
Measles (085)	10,097	10,678	10,678	35th	276,598	611,261	539,754	257,468	560,865	504,808
Meningococcal meningitis (057.0)	73	47	57	37th	3,121	2,786	3,032	2,208	1,944	2,060
Pneumonia (490–493)	987	1,015	-------	(1)	(1)	(1)	--------	54,207	49,170	-------
Acute poliomyelitis (080)	336	409	204	11th	1,662	1,790	1,112	2,790	2,705	1,579
Rocky Mountain spotted fever (104)	19	26	22	(1)	(1)	(1)	(1)	147	206	154
Scarlet fever (050)	631	649	1,053	32d	54,269	78,148	84,707	37,830	55,604	58,021
Smallpox (084)	-------	1	3	35th	44	50	193	24	40	139
Tularemia (059)	20	21	20	(1)	(1)	(1)	(1)	496	612	497
Typhoid and paratyphoid fever (040, 041) [3]	88	74	89	11th	818	783	899	1,328	1,271	1,372
Whooping cough (056)	2,653	1,244	2,052	39th	88,432	36,263	80,315	66,896	26,230	49,049

[1] Not computed. [2] Deduction: North Carolina, week ended June 3, 1 case. [3] Including cases reported as salmonellosis.

of last year's high incidence. On this basis, the cumulative total for the current disease year, or the cumulative total since the seasonal low week (March 18, 1950), is slightly less than the corresponding total for last year, 1,662 cases as compared with 1,790. Corresponding cumulative totals for the higher States showed Texas with 578 cases, California 215, New York 63, Oklahoma 58, Florida 49, Mississippi 46, Iowa 40, and Michigan 38.

The total number of cases of influenza reported for the current week was 619 as compared with 572 for the corresponding period last year. The 5-year (1945–49) median was 631. States reporting the largest number of cases of influenza for the week were: Texas (344), Virginia (91), and Arizona (48).

Reported cases of meningococcal meningitis for the week numbered 73 as compared with 75 last week and 47 for the corresponding week last year. The 5-year (1945–49) median was 57. The largest number of cases was reported by New York with 8.

Reported cases of whooping cough numbered 2,653 for the week as compared with 2,743 last week and 1,244 for the corresponding week last year. The highest corresponding week in the past 5 years was in 1947 when 3,687 cases were reported. The cumulative total since the seasonal low week (October 1, 1949) was 88,432, the second highest total in the last 5 years. The high cumulative total during this 5-year period was 1947 when 98,505 cases were reported. The low cumulative total number of cases of whooping cough was 36,263 for 1949.

The total number of cases of infectious encephalitis reported for the week was 27 as compared with 22 last week, 11 for the corresponding week last year, and 9 for the 5-year (1945–49) median. The cumulative total for 25 weeks of this calendar year was 344 which was higher than any corresponding total the past 5 years. The corresponding 5-year median was 221 cases.

Deaths During Week Ended June 24, 1950

Data for 94 large cities of the United States:	*Week ended June 24, 1950*	*Corresponding week, 1949*
Total deaths	8, 730	8, 877
Median for 3 prior years	8, 684	----------
Total deaths, first 25 weeks of year	240, 031	237, 797
Deaths under 1 year of age	574	583
Median for 3 prior years	612	----------
Deaths under 1 year of age, first 25 weeks of year	15, 518	16, 167
Data from industrial insurance companies:		
Policies in force	69, 748, 425	70, 389, 046
Number of death claims	12, 986	12, 166
Death claims per 1,000 policies in force, annual rate	9. 7	9. 0
Death claims per 1,000 policies, first 25 weeks of year, annual rate	9. 8	9. 5

Reported Cases of Selected Communicable Diseases: United States, Week Ended June 24, 1950

[Numbers under diseases are International List Numbers, 1948 revision]

Area	Diphtheria (055)	Encephalitis, infectious (082)	Influenza (480–483)	Measles (085)	Meningitis, meningococcal (057.0)	Pneumonia (490–493)	Poliomyelitis (080)
United States	44	27	619	10,097	73	987	336
New England	**3**	**1**	**1**	**1,374**	**2**	**26**	**5**
Maine			1	9		2	1
New Hampshire				37			
Vermont				1			
Massachusetts	3	1		909	1		3
Rhode Island				2		6	
Connecticut				416	1	18	1
Middle Atlantic	**8**	**9**	**2**	**3,099**	**16**	**265**	**36**
New York	3	5	[1] 2	1,163	8	188	17
New Jersey	1	3		1,196	2	23	16
Pennsylvania	4	1		740	6	54	3
East North Central	**8**	**6**	**12**	**2,939**	**11**	**143**	**21**
Ohio	3		1	496	4	21	5
Indiana	2	1		141		3	3
Illinois		3	2	941	4	76	5
Michigan	2	2	1	573	2	35	4
Wisconsin	1		8	788	1	8	4
West North Central	**3**	**3**	**12**	**475**	**8**	**81**	**17**
Minnesota	1	1	5	60	1	24	1
Iowa	1			177	2	1	9
Missouri		1	1	66	2	13	5
North Dakota			1	8	1	26	
South Dakota		1		43			
Nebraska			5	88	1	2	2
Kansas	1			33	1	15	
South Atlantic	**5**	**1**	**115**	**448**	**9**	**124**	**38**
Delaware				20			
Maryland			4	61		30	
District of Columbia			2	22		23	1
Virginia	1		91	72	2	29	3
West Virginia	1		1	43	1	10	4
North Carolina		1		54	3		5
South Carolina			12	23		12	15
Georgia			5	21	2	7	1
Florida	3			132	1	13	9
East South Central	**7**	**1**	**10**	**244**	**8**	**69**	**21**
Kentucky	3		1	130	2	9	5
Tennessee		1	6	78	1		2
Alabama	2		2	82	5	43	5
Mississippi	2		1	4		17	9
West South Central	**7**	**3**	**375**	**327**	**15**	**202**	**140**
Arkansas		1	13	32	2	4	8
Louisiana				11	5	16	2
Oklahoma			18	19	2	10	23
Texas	7	2	344	265	6	172	107
Mountain	**1**	**1**	**79**	**566**	**1**	**44**	**19**
Montana			10	34		2	
Idaho			4	64			1
Wyoming				20			6
Colorado			15	252	1	16	3
New Mexico			2	20		16	2
Arizona			48	19		7	6
Utah	1	1		157		3	1
Nevada							
Pacific	**2**	**2**	**13**	**625**	**3**	**33**	**39**
Washington				41			1
Oregon			5	10	1	13	5
California	2	2	8	574	2	20	33
Alaska						1	
Hawaii				5			2

[1] New York City only.

Anthrax: New Jersey, 1 case.

Reported Cases of Selected Communicable Diseases: United States, Week Ended June 24, 1950—Continued

[Numbers under diseases are International List Numbers, 1948 revision]

Area	Rocky Mountain spotted fever (104)	Scarlet fever (050)	Smallpox (084)	Tularemia (059)	Typhoid and paratyphoid fever[1] (040, 041)	Whooping cough (056)	Rabies in animals
United States	19	631		20	88	2, 653	130
New England		**101**			**2**	**241**	
Maine		1				22	
New Hampshire		2				1	
Vermont						20	
Massachusetts		87			1	95	
Rhode Island		2				45	
Connecticut		9			1	58	
Middle Atlantic		**135**			**6**	**326**	**23**
New York		[2] 83			3	148	22
New Jersey		11			1	107	
Pennsylvania		41			2	71	1
East North Central	**2**	**138**		**1**	**8**	**458**	**33**
Ohio		44			1	89	4
Indiana	1	1				20	11
Illinois	1	16		1	5	76	2
Michigan		57			2	172	15
Wisconsin		20				101	1
West North Central		**25**		**2**		**155**	**16**
Minnesota		8				21	
Iowa		3				36	16
Missouri		7		2		33	
North Dakota		1				24	
South Dakota		1				3	
Nebraska		4				1	
Kansas		1				37	
South Atlantic	**11**	**43**		**3**	**18**	**423**	**12**
Delaware		2				7	
Maryland	3	11			1	42	
District of Columbia		1				3	
Virginia	4	12				100	2
West Virginia	1	5			8	85	6
North Carolina	1	6			1	135	
South Carolina	2	1		1	4	16	2
Georgia		4		1	4	11	2
Florida		1		1		24	
East South Central	**3**	**32**			**8**	**107**	**20**
Kentucky	1	12			1	21	11
Tennessee		11			4	49	5
Alabama	1	6			1	28	3
Mississippi	1	3			2	9	1
West South Central	**1**	**29**		**11**	**26**	**508**	**25**
Arkansas	1			8	3	34	2
Louisiana		2			5	12	
Oklahoma		12		1	4	36	4
Texas		15		2	14	426	19
Mountain	**2**	**16**		**3**	**1**	**185**	**1**
Montana	2	1		2		33	
Idaho		1				18	
Wyoming		1					
Colorado		3				19	
New Mexico		5			1	43	
Arizona		3				53	1
Utah		2		1		19	
Nevada							
Pacific		**112**			**19**	**250**	
Washington		11				76	
Oregon		4				37	
California		97			19	137	
Alaska						30	
Hawaii		1				1	

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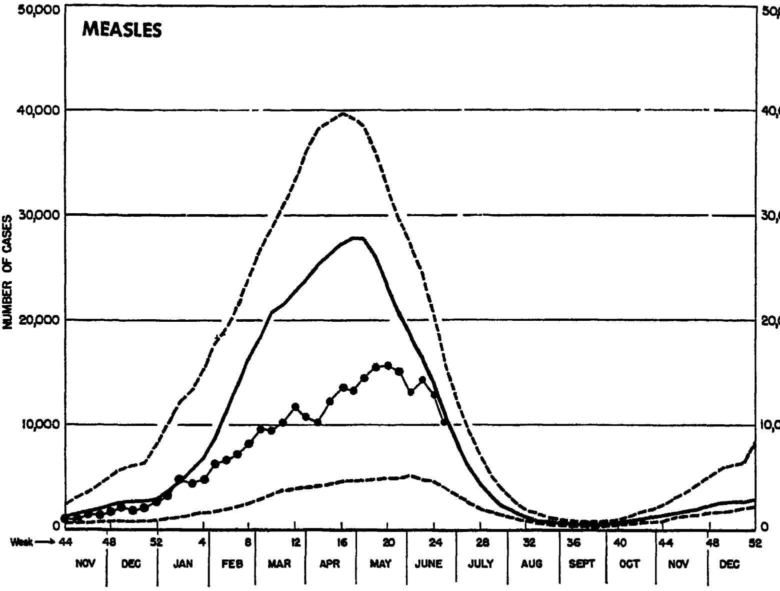
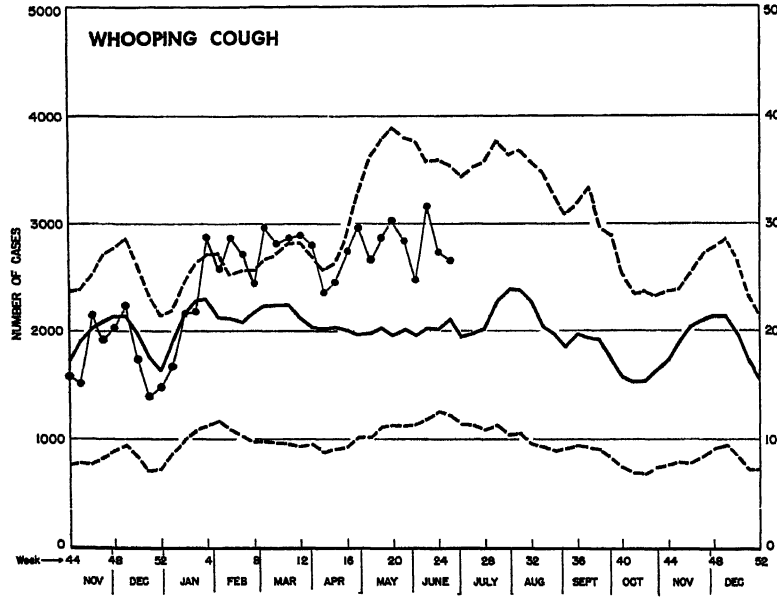
[1] Including cases reported as salmonellosis.

[2] Including cases reported as streptococcal sore throat.

Communicable Disease Charts

All reporting States, November 1949 through June 24, 1950





The upper and lower broken lines represent the highest and lowest figures recorded for the corresponding weeks in the 5 preceding years. The solid line is a median figure for the 5 preceding years. All three lines have been smoothed by a 3-week moving average. The dots represent numbers of cases reported for the weeks, 1949–50.

FOREIGN REPORTS

CANADA

Reported Cases of Certain Diseases—Week Ended June 10, 1950

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Brucellosis					1	1					2
Chickenpox			20		106	213	20	6	59	90	514
Diphtheria				1	1				1		3
Dysentery, bacillary										1	1
Encephalitis, infectious						1					1
German measles			31			1,388	1	84	99	359	1,962
Influenza			25			1					26
Measles			3		482	345	43	15	17	199	1,104
Meningitis, meningococcal						3		1			4
Mumps			56		150	267	11	57	93	129	763
Poliomyelitis					1	1				3	5
Scarlet fever			1		49	34	2	5	33	5	129
Tuberculosis (all forms)	17		7	6	90	33	8	8	21	38	228
Typhoid and paratyphoid fever					1	1					2
Venereal diseases:											
Gonorrhea	3		5	13	116	46	12	17	31	47	290
Syphilis			8	2	57	26	3	12	3	10	121
Other forms										1	1
Whooping cough	2		2		65	49	1	3		98	220

JAPAN

Influenza. During the epidemic of influenza which began in Japan early in December 1949, and ended the latter part of April 1950, a total of 15,904 cases was reported. The peak incidence occurred during the week ended February 11, when 2,746 cases were reported.

MADAGASCAR

Reported Cases of Certain Diseases and Deaths—April 1950

Disease	Aliens		Natives	
	Cases	Deaths	Cases	Deaths
Beriberi			1	
Bilharziasis	1		49	
Diphtheria	4	3	5	2
Dysentery:				
Amebic	17		254	23
Bacillary			59	4
Erysipelas			18	1
Influenza	20		3,308	52
Leprosy			40	
Malaria	277		42,033	214
Measles			73	
Meningitis, meningococcal			1	
Mumps	1		322	
Plague			6	5
Pneumonia (all forms)	6		841	146
Puerperal infection			2	
Tuberculosis, pulmonary	12	2	103	11
Typhoid fever	1		10	5
Whooping cough	16	5	351	4

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

The following reports include only items of unusual incidence or special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

Burma. During the week ended June 10, 1950, one fatal case of cholera was reported in Akyab, and one fatal case was reported in Bassein.

India. During the week ended June 10, 1950, 318 cases of cholera were reported in Calcutta, and 283 cases were reported during the week ended June 17. One case was reported in Bombay during the week ended June 10. This is the first indigenous case reported during the current year.

Pakistan. During the week ended June 10, 1950, 10 cases of cholera, with 6 deaths were reported in Chittagong.

Plague

China. During the month of March 1950, 37 cases of plague, with 14 deaths, were reported in the Districts of Fukien Province. Nine deaths were also reported on Kinmen Island March 21–31. This island is located near Amoy.

Peru. During the month of April 1950, one case of plague was reported in Huacho, Chancay Province, Lima Department.

Smallpox

Cameroon (French). Smallpox has been reported in French Cameroon as follows: May 1–10, 1950, 30 cases, 9 deaths; May 11–20, 11 cases, 1 death.

Chile. During the period May 23–June 3, 1950, 318 cases of smallpox were reported in Chile. The highest reported incidence occurred in Malleco Province, where 183 cases were recorded.

Greece. Smallpox has been reported in Greece as follows: During the period June 6–12, 1950, 8 cases in Attica Department; on June 9, one case in Athens; on June 19, one fatal case in the port of Xylokastron; on June 20, one case in Piraeus.

Indonesia (Java). Smallpox has been reported in Surabaya, as follows: May 1–31, 1950, 605 cases, 174 deaths; week ended June 3, 151 cases; week ended June 10, 172 cases.

Pakistan. During the period May 6–27, 1950, 113 cases of smallpox, with 78 deaths, were reported in Dacca.

Typhus Fever

Afghanistan. During the period May 1–31, 1950, 248 cases of typhus fever were reported.

Ecuador. During the month of April 1950, 18 cases of typhus fever (including 5 cases in Quito) were reported in Ecuador.

Egypt. During the week ended June 10, 1950, 4 cases of typhus fever were reported in Cairo.

India. Typhus fever has been reported in Kashmir State, as follows: Week ended April 15, 1950, 30 cases, 14 deaths; week ended April 22, 8 cases, 5 deaths; week ended May 6, 31 cases, 1 death.

Jamaica. During the week ended June 3, 1950, 5 cases of murine typhus fever were reported in Kingston.

Japan. The outbreak of typhus fever which began in Tokyo during the week ended January 14, 1950, and later spread to Yokohama, was reported to have reached its peak in Tokyo during the week ended February 11, and in Yokohama during the week ended February 18. The total number of cases reported in all Japan for the period January 1–April 15, 1950, was 731 (49 deaths). Of these, 222 cases, 19 deaths, were reported in Tokyo, and 423 cases, 23 deaths, in Yokohama.

Republic of Korea. During the month of May 1950, 57 cases of typhus fever (murine type) were reported in Seoul.

Yellow Fever

Peru. One death from yellow fever in San Ramon, Junin Department, was reported confirmed early in June 1950. The specific dates of onset and confirmation were not stated.

Plague Infection in Kittitas County, Wash.

Under date of June 22, 1950, plague infection was reported proved in a specimen of 42 fleas as follows: *Megabothris abantis* 20, *Meringis shannoni* 11, *Thrassis gladiolis johnsoni* 7, and *Malaraeus telchinum* 4. This specimen was taken from 8 sagebrush voles, *Lagurus curtatus*, trapped June 7, 1950, 18 miles east of Ellensburg on United States Highway 10, Kittitas County, Wash.

Tularemia Infection in a Tick, Valencia County, N. Mex.

Under date of June 22, 1950, tularemia infection was reported proved in a specimen of one tick taken from a cottontail rabbit, *Sylvilagus auduboni*, shot June 7, near El Morro National Monument, Valencia County, N. Mex.

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The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

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PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
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Public Health Reports

Vol. 65 • JULY 21, 1950 • *No. 29*

Child Health Services in Twelve Metropolitan Districts

By Maryland Y. Pennell, M. Sc. Hyg., Katherine Bain, M. D., and John P. Hubbard, M. D.*

Children living in or near cities have relatively more medical services available than do children in isolated counties, as measured in terms of doctors' visits, days of hospital care, visits to well-child conferences and to other types of clinics (*1*,*2*). However, it cannot be assumed that the services in the urban areas are invariably good, or altogether adequate in quality or quantity. Comparison of statistics for different areas indicates that the services available vary greatly, even between areas in which metropolitan development has been most extensive. It has therefore seemed appropriate to present comparative data for the 12 metropolitan districts, grouped in earlier publications under the heading "greater metropolitan counties," to show differences which exist among districts and between totals for all such districts, for the balance of the country, and for the country as a whole.

The group of counties forming each district "tends to be a more or less integrated area, with common economic, social, and, often, administrative interests" (*3*).[1] The composition of each district, together with pertinent data from the Study of Child Health Services on child population, doctors in private practice, public health nurses, general hospital beds, and certain community health services for children, is given in the appendix.

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*From the Public Health Service and the Children's Bureau of the Federal Security Agency, and the American Academy of Pediatrics Study of Child Health Services.

[1] The concept of metropolitan districts used in the analysis of data collected by the Study of Child Health Services represents only a slight modification of the pattern of metropolitan districts set up by the Bureau of the Census on the basis of 1940 census data. In the population of a district the Census Bureau included, in addition to the central city, all adjacent and contiguous minor civil divisions that were thickly settled (*3*). In this report on child health services the concept of a metropolitan district has been modified so that its outline follows county borders (*4*). A county was classified as metropolitan if half of the population (or at least 50,000 persons) were within the metropolitan district outlined by the Census Bureau. Of the resulting districts, 12 had population totals in excess of 1,000,000 at the time of the study. These 12 districts, comprising some 63 counties, make up the "greater metropolitan districts" which are the subject of special study in this report. It may be noted that the shift to county lines is of minor consequence in the interpretation of the material since 95 percent of the inhabitants of the counties live within the districts set up by the Bureau of the Census.

The location of the districts in and around the cities of Baltimore, Boston, Chicago, Cleveland, Detroit, Los Angeles, Philadelphia, Pittsburgh, St. Louis, San Francisco (including Oakland), Washington, and New York (including the northeastern New Jersey cities of Elizabeth, Jersey City, Newark, and Paterson) is shown in figure 1.

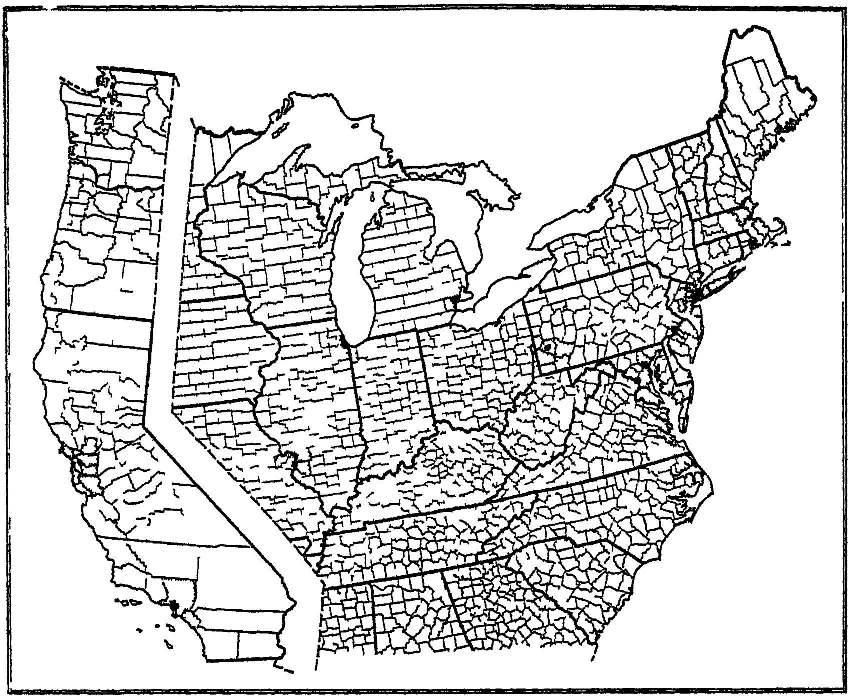

Figure 1. Location of twelve metropolitan districts used in analysis of child health services.

On this map the black areas represent the geographic extent of the central city; the shaded areas, the extent of the counties in each district. Only 5 percent of the total land area in the combined districts is within the main cities. Cleveland is the one district that does not spread beyond the boundaries of the county of which it is a part; the central city includes 16 percent of the district area. All of the other districts have less than one-tenth of the total area in the city proper, with the city of Pittsburgh accounting for only 1 percent.

In 1940 the combined districts had an enumerated population of 36,402,167 persons, or 28 percent of the United States total. Sixty-two percent of the district population lived within the 17 central cities. The proportion of the district population that was within the central city varied widely, ranging from 79 percent in Baltimore to 27 percent in Boston The Boston district has a large proportion of its inhabitants living in large cities of 50,000 or more persons other than the city of Boston. Within the 12 districts only about one-fourth of the population did not live in cities as large as 50,000 persons. Two percent of the population was classified as rural-farm, the largest proportion—4 percent—occurring in the districts of Pittsburgh, St. Louis, and San Francisco-Oakland.

In these metropolitan counties at the time of the study, there were about 8,374,699 children under 15 years of age.[2] These metropolitan districts accounted for 23 percent of the children in the entire United States. Among the 12 districts, the New York-northeastern New Jersey district had the largest number, 2,480,481. The Chicago district was the only other one with more than 1 million children. Five additional districts had as many as 500,000 children Three districts had a child population of less than 300,000: Baltimore, Cleveland, and Washington.

Health Personnel and Child Visits

Physicians

The Study of Child Health Services inquired into the count of physicians in private practice and a list of names was prepared in each State (*4*). The data collected indicated that there were about 117,000 private practitioners in the United States in 1946. Retired physicians, those in full-time academic, administrative, research or institutional positions, and those employed by Federal, State, and local health agencies were excluded from the count.

The physicians in private practice in the metropolitan districts totaled 48,123, or 41 percent of those in the country. It is evident that the districts had a disproportionately large share in as much as only about one-quarter of the population lived within their boundaries. Specialists particularly were concentrated in these large urban areas; half of the pediatricians and of the other specialists were enumerated therein. Even among general practitioners, 37 percent were found to have offices in these counties.

Comparisons between districts are facilitated when totals can be related to some common population base. Since county population estimates upon which district totals might be built up are not available for a current year, estimates of child population under 15 years of age have been used. The numbers of physicians have been expressed as ratios reflecting the number per 1,000 children for each of the 12 districts, as shown in the first column of table 1.

The combined districts had 5.7 physicians per 1,000 children, as compared with a corresponding rate of only 2.5 for the balance of the

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[2] Child population as of July 1, 1945, was estimated as a part of the Study of Child Health Services. For the method used, see reference (*4*)

Table 1. *Health personnel and visits to children under 15 years of age in each of 12 metropolitan county districts, 1946*

Metropolitan county district	Physicians in private practice[1]						Dentists in private practice[1]		Public health nurses[2]	
	Number per 1,000 children under 15			Child visits per 1,000 children per day[3]			Number per 1,000 children under 15	Child visits per 1,000 children per day[3]	Number per 1,000 children under 15	Child home nursing visits per 1,000 children per year
	Total[4]	General practitioners	Pediatricians	Total[4]	General practitioners	Pediatricians				
New York-northeastern New Jersey	7.54	4.42	0.27	21.0	14.7	2.9	[5] 4.54	[5] 8.07	0.86	477
Philadelphia	5.61	3.13	.21	17.5	11.6	2.3	[5] 3.32	[5] 5.77	.53	378
San Francisco-Oakland	5.60	2.64	.26	17.8	9.5	4.3	3.90	6.02	.64	255
Chicago	5.57	3.52	.19	15.1	10.6	2.3	3.85	6.78	.46	549
Los Angeles	5.54	2.66	.20	13.5	7.7	2.5	3.27	4.48	.36	119
Cleveland	5.41	3.00	.21	14.6	8.8	2.6	4.00	6.39	.54	215
Washington	5.37	2.70	.28	17.3	9.2	4.0	2.84	4.56	.88	172
Boston	5.36	3.21	.22	20.6	15.6	2.1	3.00	6.97	.89	446
St. Louis	4.55	2.33	.13	13.9	8.7	2.6	2.95	4.00	.37	162
Baltimore	4.52	2.16	.20	14.4	8.6	2.7	1.82	3.15	.83	495
Pittsburgh	3.81	2.38	.11	17.5	11.4	1.9	2.42	4.59	.38	106
Detroit	3.23	1.93	.10	14.6	10.0	2.0	1.72	3.63	.62	430
Total metropolitan county districts	5.75	3.27	.21	17.6	11.7	2.6	3.38	[5] 5.97	.65	374
Balance of country	2.49	1.72	.06	12.3	9.6	1.2	1.35	[6] 2.39	.33	160
United States	3.24	2.08	.10	13.5	10.1	1.5	1.82	[6] 3.18	.40	210

[1] Excludes retired doctors and those in full-time academic, administrative, research or institutional positions, and those employed by Federal, State, and local health agencies.

[2] Registered nurses working full-time for community health agencies, both official and voluntary, that give general service to children. Excludes nurses giving special services such as (a) nurses working full-time in schools, (b) nurses employed by agencies giving only industrial, tuberculosis, or venereal disease service, and (c) supervisors employed by State agencies.

[3] Based on 1-day record of visits, with about one-seventh of the doctors reporting for each day of the week. Data adjusted for season and nonresponse; for methodology see reference (*2*).

[4] Includes specialists other than pediatricians. Specialists are those who reported practice limited to a recognized specialty, irrespective of certification.

[5] Exclusive of New Jersey.

[6] Exclusive of New Jersey and Wisconsin.

country. Eight of the districts had 5 or more physicians per 1,000 children, a rate twice as high as that for the balance of the country. The Detroit district was the only one that did not exceed the United States average of 3.2 physicians per 1,000 children. The New York-northeastern New Jersey district had the largest ratio of physicians to child population. The Detroit district showed less than half as many, whether stated in terms of general practitioners, pediatricians, or all physicians.

In the course of the study each physician was asked to report by mail, for an assigned day, the number of children seen for sick care and health supervision. The number of child visits in relation to population was highest in the New York-northeastern New Jersey and Boston districts, where there were about 21 visits per 1,000 children on an average day. The other districts had rates that ranged from 17.8 to 13.5 visits. Children in the balance of the country received one-third less physicians' visits than those in the combined 12 districts.

It is recognized that the district total rates are based upon totals which include visits to children who reside beyond the district borders. It is believed, however, that the services of general practitioners and of pediatricians are concerned for the most part with the care of children residing in the immediate area of their location. For this reason separate rates have been computed to show child-visit ratios for these two physician groups. The same two districts, New York-northeastern New Jersey and Boston, were in first place in terms of visits to general practitioners. However, when pediatricians' visits are considered, the San Francisco-Oakland and Washington districts, where almost one-fourth of the total physicians' visits to children were made by child specialists, led all other districts. In the Boston and Pittsburgh districts pediatricians accounted for as little as one-tenth of the total child visits to physicians.

Dentists

A total of 65,684 dentists was reported as being in private practice in the United States at the time of the study. Of these, 28,270 had offices in the 12 districts. This amounts to a concentration of 43 percent in the counties where about one-fourth of the people live and follows a pattern similar to that for physicians.

There were 3.4 dentists per 1,000 children in the combined districts, as compared with a rate of 1.4 for the balance of the country (table 1). Among the 12 districts the ratio of dentists to child population was highest in the New York counties, and lowest in the Detroit and Baltimore districts.

The number of dentists in a district is an indication of the number of children under dental care. Each dentist was queried in regard to his child patients on an assigned day, and the aggregate child visits showed a wide variation among the districts. The New York rate of 8.1 child visits per 1,000 children on an average day was more than twice the low rate in the Baltimore district. Five of the districts had more than 6 visits per 1,000 children on 1 day, the combined district rate. Children in the balance of the country received less than half the rate of visits of those in the 12 districts.

Public Health Nurses

Of the total 14,550 full-time nurses engaged in general public health programs in the United States, according to the study reports, 5,415, or 37 percent, were employed by official and voluntary agencies in the 12 metropolitan districts. In addition, in these districts there were about 200 nurses employed on a part-time basis. Nurses serving in agencies giving only school health, industrial hygiene, tuberculosis, or venereal disease services have been excluded from this count.

Since a large part of the public health nurses' service is for children, the total number of nurses in relation to the child population is shown in table 1. In the combined districts there were 0.65 full-time public health nurses per 1,000 children under 15 years of age, twice the rate prevailing in the balance of the country. The rates ranged from 0.89 to 0.36 nurses per 1,000 children in the 12 districts. The highest ratios of nurses to children were in the Boston, Washington, and New York-northeastern New Jersey districts; the lowest ratios, in Los Angeles, St. Louis, and Pittsburgh.

The National Organization for Public Health Nursing has recommended a standard of one nurse to a population of 2,000 when bedside nursing is to be included in the public health nursing program *(5)*. It is recognized that nursing needs vary with age, and only a very rough indication of the needs of children is possible. On the basis of one-fourth of the population being under 15 years of age, the ratio has been restated as about two nurses per 1,000 children under 15. The number of nurses reported as being in the combined districts in 1946 is only one-third those required to meet such a minimum standard. Even the Boston district, with the highest rate of 0.89 nurses per 1,000-child population, would have to more than double its total number to come up to this level.

Over 3 million home visits were made by public health nurses during the study year to children in these metropolitan districts. This amounted to 41 percent of the total home nursing visits to children in the entire country. In terms of child population there were 549 visits per 1,000 children per year in the Chicago district where the highest rate was found. Four districts—Washington, St. Louis, Los Angeles, and Pittsburgh—had rates lower than the United States average. The combined district rate, however, was more than twice the rate prevalent in the remainder of the country.

General Hospital Facilities and Services

In the metropolitan districts are located 865 general hospitals (with 5 or more beds), including those for maternity and pediatric care. This accounts for only one-sixth of the total number of such hospitals which are located in the United States. Although comparatively few of the hospitals are in these districts, those included are relatively large in size so that about one-third of the total hospital beds are within the district borders.

The general hospitals in the 12 districts had a total of 156,417 beds at the time of the study, which gave a rate of 18.7 beds per 1,000 children (table 2). Total beds in relation to child population has been used as an index of the total hospital facilities available to

Table 2. *Facilities and services for children in general hospitals in each of 12 metropolitan county districts, 1946*

Metropolitan county district	Number per 1,000 children under 15		Percent of total beds reserved for children	Percent of child admissions to hospitals with pediatric units	Child OPD visits per 1,000 children under 15, per year
	Total beds [1]	Beds for children [2]			
New York-northeastern New Jersey	20.2	2.33	11.5	92	127
Philadelphia	21.3	2.55	12.0	90	73
San Francisco Oakland	20.1	1.77	8.8	80	192
Chicago	17.9	2.22	12.4	82	132
Los Angeles	15.4	.90	5.9	76	183
Cleveland	19.8	1.25	6.3	90	163
Washington	21.0	2.29	10.9	90	289
Boston	19.3	2.52	13.1	86	161
St Louis	20.9	2.31	11.1	90	136
Baltimore	22.5	1.97	8.8	94	181
Pittsburgh	13.9	1.77	12.8	97	300
Detroit	13.8	1.19	8.7	79	136
Total metropolitan county districts	18.7	2.02	10.8	88	157
Balance of country	11.1	.95	8.6	64	33
United States	12.8	1.20	9.3	71	62

[1] In hospitals with 5 or more beds, both those registered by the American Medical Association and those unregistered. Includes maternity and pediatric hospitals.

[2] In hospitals with 25 or more beds where there is a pediatric unit of 5 or more beds permanently set aside for the care of children.

children. Obviously the beds used for child care fall below this figure but well above the total given as "Beds for children" in the second column of the table. This category is limited to hospitals with 25 or more beds where there is a pediatric unit of 5 or more beds permanently set aside for the care of children. Except in pediatric hospitals and those with separate pediatric units, many beds are used interchangeably for children and adults according to need and circumstance.

The rate of total beds to child population in the metropolitan districts was one-and-a-half times that of the balance of the country. Among the districts the range in rates was from 22.5 in Baltimore to less than 14 total beds per 1,000 children in Pittsburgh and Detroit.

Beds reserved for children totaled 16,878 in the district hospitals with pediatric units, as defined above. This accounted for 39 percent of the pediatric beds in the entire country. The rate of beds for children per 1,000 children under 15 years of age was 2.0 in the 12 districts, as compared with half that figure in the balance of the country.

The districts that ranked low in the ratio of pediatric beds to child population were Los Angeles, Cleveland, and Detroit. In the first two as few as 6 percent of the total beds were reserved for the care of children. The Boston district had the largest proportion of beds set aside for children and next to the largest rate of pediatric beds, being exceeded only by the Philadelphia district.

While the proportion of all beds set aside for children in general hospitals varied from 6 to 13 percent among the districts, a very large part of child admissions to hospitals was made to those hospitals having pediatric units. In the combined districts, 88 percent of the total child admissions were to such hospitals. Within the districts the percentages varied from a high of 97 in Pittsburgh to a low of 76 in Los Angeles. In the balance of the country less than two-thirds of the child admissions were to hospitals with pediatric units.

Outpatient departments are recognized as a feature of large urban hospitals. In the combined districts there were 367 outpatient departments admitting children—40 percent of the total number. A total of 272 hospitals had separate pediatric units, a total which represents more than half of all such clinics in the country. The Pittsburgh district had a surprisingly large number of clinics and the 360 child OPD visits per 1,000 children per year was the highest rate reported. The Washington district was in second place, while Philadelphia was at the bottom of the list. The combined district rate of child OPD visits was nearly five times that of the balance of the country (table 2).

Well-child Conferences

Well-child conferences under the direction of a physician offer preventive medical service such as immunizations, routine health examinations, advice on feeding, and other care designed to maintain the health of well children. Clinics operated by community health agencies provide 13 percent of the health supervision visits to infants and preschool children (other than the newborn) in the metropolitan districts; the balance of the service is given by physicians in their private practice (*2*).

The 12 districts accounted for nearly half of the total clinic sessions held in the United States during the study year although they represented less than one-fourth of the total children under 5 years of age. The rate of sessions within the districts was nearly three times that in the balance of the country.

Voluntary agencies gave only a small part of the well-child clinic care; they provided one-fifth of the sessions in the combined districts. Such agencies sponsored a larger proportion of the sessions in the Philadelphia area (49 percent) and in the Chicago area (41 percent). Official agencies, however, accounted for at least 95 percent of the sessions in the Cleveland, Los Angeles, and St. Louis districts.

Most of the sessions in the combined districts, 84 percent, were for both infants and preschool children. The Chicago district was unique in offering a large proportion of unmixed sessions; there, 62 percent of the total sessions were for infants and 6 percent for preschool children. In that district nearly three-fourths of the children admitted were infants, indicating the concentration on baby clinics. Preschool children, however, were in the majority in half of the districts, but even in the districts with the highest proportion—Baltimore and Detroit—they comprised but two-thirds of the patients.

The districts with the highest rate of sessions were usually those with the largest number of clinic visits and of patients. The Baltimore district was in first place on all three indices; the Detroit district, in last position. Half of the districts reported 23 or more sessions, 502 or more visits, and 145 or more patients per 1,000 children under 5, per year.

In the 12 districts the number of visits per 1,000 children under 5 during the year was nearly four times the rate in the balance of the country, but the number of children seen was only slightly more than twice as many. This difference is reflected in terms of the number of visits per patient during the year: 3.6 in the districts as contrasted with 2.4 in the rest of the country. Thus repeat visits necessary for continuing health supervision were more common in metropolitan areas. In the Baltimore district with the highest rate of attendance, about one child out of five, in the age group under 5 years, attended well-child clinics and he averaged 3.0 visits during the year. In the Chicago district, there was an average of 5.4 visits per patient but fewer children were handled (table 3).

Table 3. *Well-child conferences in each of 12 metropolitan county districts, 1946*

Metropolitan county district	Number per 1,000 children under 5, per year			Number of visits per patient per year	Percent of sessions with pediatrician in attendance
	Sessions	Visits	Patients		
New York-northeastern New Jersey	30	516	153	3.4	11
Philadelphia	24	502	145	3.5	30
San Francisco-Oakland	28	584	152	3.8	25
Chicago	23	552	102	5.4	58
Los Angeles	12	284	82	3.4	85
Cleveland	16	185	77	2.4	71
Washington	37	551	179	3.1	36
Boston	20	460	147	3.1	51
St. Louis	13	287	83	3.4	56
Baltimore	40	618	203	3.0	60
Pittsburgh	15	130	32	4.0	2
Detroit	3	54	19	2.8	0
Total metropolitan county districts	22	422	118	3.6	31
Balance of country	8	106	45	2.4	24
United States	11	182	62	2.9	27

The pattern of staff attendance at the well-child conferences varied markedly among the districts. In the combined districts, 46 percent of the sessions were attended by general practitioners, 31 percent by pediatricians, and 23 percent by health officers and physicians employed full-time by the sponsoring agencies. The last group of physicians accounted for at least half of the sessions in three districts—Philadelphia, San Francisco-Oakland, and Washington—but virtually none in the areas of Baltimore, Chicago, and Cleveland. Pediatricians were strikingly absent from the conferences held in the Detroit and Pittsburgh districts (table 3).

Information on types of practices in well-child conferences was tabulated to give a rough indication of the quality of services and has been expressed in terms of the proportion of the sessions that were sponsored by community health agencies having that practice. Routine immunization for smallpox and diphtheria was a general practice, followed in 83 percent of the sessions held in the combined districts, but it was noticeably low in the areas of Boston, Detroit, and Philadelphia. The practice of routine immunization for whooping cough was not as prevalent and was reported for only two-thirds of the sessions. Practically all of the agencies provided public health nursing follow-up in the home, and advice to mothers on formulas, feeding, care, and training. Consultant services available to the staff and to the parents showed considerable variation among the districts. Three-fourths of the total sessions offered such service by a nutritionist, but the Chicago and Washington areas were low in this practice. Forty-five percent of the sessions were by agencies with a psychologist or psychiatrist on the staff, with a range from 3 to 85 percent among the districts. It should be borne in mind that all of these percentages are based on the agencies' statements of policy, and practice may vary as to how thoroughly policies are carried out.

Dental Clinic Care

Children's dental clinics provided only 6 percent of the total dental care that the children in the 12 districts received during the study year. The other 94 percent was furnished by dentists in their private practice (*2*).

The pattern of more clinic care in or near large cities is again evident. The clinics in the metropolitan districts accounted for almost two-thirds of the total clinic dentist-hours for the entire country. Within the 12 districts, 80 percent of the dentists' time was reported for clinics operating in the central cities.

Some of the districts offered virtually no dental clinic service for children, by either official or voluntary agencies. Voluntary agencies provided one-third of the total dentist-hours in the combined districts. In the Detroit districts, they accounted for half of the time; in the Philadelphia area, as much as three-fourths. Yet, they were missing from the Baltimore and San Francisco-Oakland districts and made little contribution in the St. Louis area during the year.

Clinics in the Boston and Washington districts provided the highest rate of care during the year, whether measured in terms of dentist-hours, visits and patients for services other than examinations, or examinations. Among the 12 districts, the range in dentist-hours per 1,000 children under 15, per year, was from 156 to 13, with the San Francisco-Oakland district in last position. With regard to visits for services other than examination, the Boston rate of 327 visits per 1,000 children per year was far above Washington with the next highest rate of 189; Cleveland had the low rate of 32. Twice as many patients received service in Boston as in the Washington district (table 4).

Table 4. *Dental clinic care for children in each of 12 metropolitan county districts, 1946*

Metropolitan county district	Number per 1,000 children under 15, per year				Number of visits [1] per patient per year	Ratio of examinations to patients given service
	Dentist-hours	Visits [1]	Patients [1]	Examinations [2]		
New York-northeastern New Jersey	92	185	47	241	3.9	5.1
Philadelphia	114	177	52	216	3.4	4.1
San Francisco-Oakland	13	39	7	40	5.8	5.9
Chicago	29	71	18	67	3.9	3.7
Los Angeles	23	81	32	229	2.5	7.1
Cleveland	45	32	6	270	5.2	44.1
Washington	147	189	72	563	2.6	7.9
Boston	156	327	150	494	2.2	3.3
St. Louis	67	82	34	239	2.4	7.1
Baltimore	132	83	24	29	3.5	1.2
Pittsburgh	68	74	19	281	3.8	14.5
Detroit	22	38	20	27	1.9	1.3
Total metropolitan county districts	74	133	42	214	3.1	5.0
Balance of country	13	24	13	77	1.9	6.0
United States	27	49	20	109	2.5	5.5

[1] For services other than examinations

[2] Includes examinations by dentists and others.

Children in the 12 districts received more than five times as much dental clinic care as those in the balance of the country when the comparison is made in terms of dentist-hours or visits for service. The difference is not quite as marked in regard to child patients per 1,000, but in the 12 districts, clinics still served three times as many patients per unit of population as were handled elsewhere.

The programs varied considerably in regard to the number of visits per patient during the year. The two districts with the highest rate of repeat visits—San Francisco-Oakland and Cleveland—were the lowest in terms of patients seen. In the combined districts there were 3.1 visits per patient per year, a rate 50 percent higher than that in the balance of the country.

The Washington and Boston districts were outstanding in the number of children examined as well as in the number given service. In those districts about 500 children per 1,000 received dental examination in children's clinics during the year. The rate of examination in the combined districts was nearly three times that in the remainder of the country.

The ratio of dental examinations to patients given service also showed considerable variation. In the Cleveland and Pittsburgh districts, the emphasis was on examinations; in the Baltimore and Detroit districts, on service. About five children were examined for every one given service in the combined districts, a rate not too different from that of the rest of the country.

Summary

The relative magnitude of the ratios of selected types of health personnel, facilities or services per 1,000 children in each of the 12 metropolitan county districts has been summarized graphically in figure 2. For any one type, the individual district rates have been divided by the average of the rates for all of the districts.

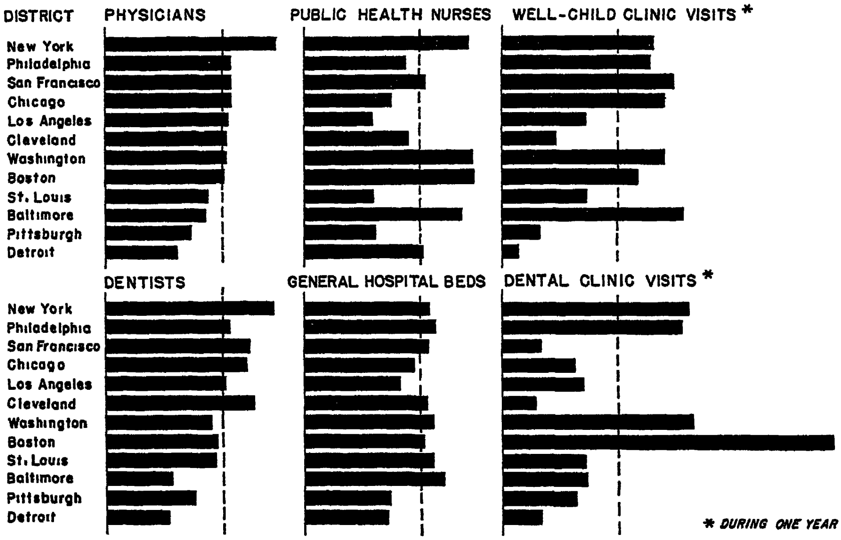

Figure 2. Summary of six indices of child health services by district, 1946. (The dotted lines indicate the unweighted combined-district averages of the rates per 1,000 children. The individual district rates have been divided by the corresponding combined-district average. The length of the bars thus indicate the inter-district variation both within one index and between indices.)

The New York district (including northeastern New Jersey) was outstanding in the number of health personnel in relation to child population, with as much as 40 percent more physicians, dentists, and public health nurses than the combined-district averages. No other district even approached its rate of physicians and dentists in private practice. With regard to nurses engaged full-time in general public health programs the Boston and Washington districts slightly exceeded the New York-northeastern New Jersey rate. The districts of Los Angeles, St. Louis, and Pittsburgh were in the lowest positions.

The Baltimore district occupied the most favorable position as to general hospital beds; the Pittsburgh and Detroit districts, the most unfavorable. The variation in hospital facilities among the 12 districts, however, is considerably less than that for health personnel.

The Baltimore district also stressed the importance of well-child conferences in the health supervision of children under 5 years of age, again in marked contrast to the Pittsburgh and Detroit areas. The clinics in the Chicago district gave more continuing health supervision as measured by visits per patient per year, but they were in third position in terms of child visits.

The variation among the districts was greatest for services provided in children's dental clinics. The Boston district had nearly three times the combined-district average of visits for service per 1,000 children per year. The Cleveland, Detroit, and San Francisco (including Oakland) districts had only about one-third the 12-district average.

Data on child population, doctors in private practice, public health nurses, beds in general hospitals, well-child clinic sessions, and dental clinic dentist-hours for children are given in the appendix for each of the 12 districts, the 63 metropolitan counties, and the 17 central cities. The information was collected during 1946 and early 1947 when medical and dental personnel were still returning from military service, and changes may have occurred in many areas.

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(*2*) Supplement to Child Health Services and Pediatric Education: Methodology and Tabulations on Services. Report of the Committee for the Study of Child Health Services, The American Academy of Pediatrics with the cooperation of the United States Public Health Service and the United States Children's Bureau. The Commonwealth Fund, New York, 1949.

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(*4*) Hubbard, J. P., Pennell, M. Y., and Britten, R. H.: Health services for the rural child: Availability of hospitals, physicians and dentists in service areas. J. A. M. A. 137: 337-343 (1948). Reprint with complete county tabulations available through American Academy of Pediatrics.

(*5*) Desirable organization of public health nursing for family service. Pub. Health Nursing 38: 387-389 (1946). Also subsequent revisions.

APPENDIX

Child population (1945): private practitioners, public health nurses, general hospital beds, and community health services for children (1946), by district, county, and central city

District, county, and central city	Child population		Private practitioners				Public health nurses, full time	Beds in general hospitals		Well-child clinic sessions during year	Dental clinic dentist-hours during year [1]
			Physicians			Dentists					
	Under 15	Under 5	Total	General practitioners	Pediatricians			Total	Pediatric		
Baltimore district	280, 705	117, 354	1, 268	605	56	512	234	6, 318	553	4, 662	36, 900
Counties:											
Anne Arundel	22, 245	8, 348	30	26	1	12	18	70	10	239	60
Baltimore	53, 733	20, 591	54	49	2	32	27	0	0	189	264
Baltimore city [2]	204, 727	88, 415	1, 184	530	53	468	189	6, 248	543	4, 234	36, 576
Central city:											
Baltimore	204, 727	88, 415	1, 184	530	53	468	189	6, 248	543	4, 234	36, 576
Boston district	632, 191	247, 431	3, 389	2, 029	136	1, 897	563	12, 170	1, 595	4, 898	98, 901
Counties:											
Essex [3]	105, 945	40, 396	503	363	15	256	80	1, 671	208	381	9, 444
Middlesex [3]	225, 594	85, 911	836	638	25	509	173	3, 064	337	1, 865	18, 824
Norfolk [3]	78, 780	29, 533	343	241	20	216	69	851	73	856	5, 395
Plymouth [3]	38, 273	14, 800	170	140	2	101	29	353	26	236	1, 706
Suffolk [2]	183, 599	76, 791	1, 537	647	74	815	212	6, 231	951	1, 560	63, 532
Central city:											
Boston	(4)	(4)	1, 451	578	71	767	197	6, 006	920	1, 560	62, 932
Chicago district	1, 028, 277	418, 310	5, 731	3, 624	196	3, 962	471	18, 441	2, 281	9, 654	29, 664
Counties:											
Illinois: Cook [2] [3]	882, 735	362, 736	5, 308	3, 305	179	3, 636	443	16, 796	2, 123	9, 434	28, 203
DuPage	28, 534	9, 324	98	79	2	67	10	250	6	68	0
Lake	31, 001	11, 963	104	75	7	78	0	433	48	124	222
Indiana: Lake [3]	86, 007	34, 287	221	165	8	181	18	962	104	28	1, 239
Central city:											
Chicago	(4)	(4)	4, 644	2, 889	144	3, 106	332	14, 948	1, 925	7, 950	23, 246
Cleveland district	268, 204	111, 097	1, 450	805	55	1, 073	144	5, 310	334	1, 803	11, 982
County:											
Cuyahoga [2] [3]	268, 204	111, 097	1, 450	805	55	1, 073	144	5, 310	334	1, 803	11, 982
Central city:											
Cleveland	(4)	(4)	1, 317	724	49	870	121	4, 782	292	1, 367	11, 572
Detroit district	675, 094	260, 645	2, 180	1, 301	66	1, 163	420	9, 287	806	855	15, 049
Counties:											
Macomb	43, 998	15, 240	32	26	0	26	8	210	22	0	2, 000
Oakland [3]	89, 626	32, 478	132	83	8	81	56	509	65	130	2, 000
Wayne [2] [3]	541, 470	212, 927	2, 016	1, 192	58	1, 056	356	8, 568	719	725	11, 049
Central city:											
Detroit	(4)	(4)	(5)	(5)	(5)	(5)	302	6, 977	606	509	929

Los Angeles district	741, 987	295, 427	4, 107	1, 977	151	2, 428	264	11, 429	671	3, 415	16, 876
Counties:											
Los Angeles [2,3]	703, 469	280, 447	3, 952	1, 866	145	2, 346	256	10, 773	645	3, 363	16, 776
Orange	38, 518	14, 980	155	111	6	82	8	656	26	52	100
Central city:											
Los Angeles	(4)	(4)	2, 121	902	59	1, 146	[6] 77	7, 124	474	1, 375	(6)
New York-northeastern New Jersey district	2, 450, 481	957, 928	18, 708	10, 962	674	(5)	2, 120	50, 068	5, 781	29, 562	227, 166
Counties:											
New York: Bronx [2]	(7)	(7)	1, 529	1, 168	6	(7)	129	3, 011	393	2, 891	14, 790
Kings [2]	(7)	(7)	3, 724	2, 327	178	2, 160	359	9, 362	1, 094	6, 783	24, 678
Nassau	104, 073	36, 726	613	420	28	364	69	966	97	273	397
New York [2]	1, 435, 478	557, 797	6, 326	2, 766	220	3, 862	553	17, 314	1, 734	6, 563	104, 553
Queens [2]	(7)	(7)	1, 561	1, 118	64	807	117	2, 664	428	2, 570	9, 991
Richmond [2]	(7)	(7)	183	119	7	97	42	570	96	668	1, 965
Rockland	16, 313	5, 243	73	57	1	41	8	207	18	56	37
Suffolk	40, 556	14, 960	167	129	1	111	26	456	43	0	0
Westchester [3]	118, 384	42, 012	830	475	47	453	119	2. 632	359	1, 547	4. 462
New Jersey: Bergen	96, 147	36, 125	343	246	7	(5)	102	597	99	520	1, 417
Essex [2,3]	177, 692	71, 174	1, 148	725	42	(5)	166	3, 538	453	2, 214	13, 052
Hudson [2,3]	131, 069	53, 872	518	348	11	(5)	94	3, 138	334	2, 742	38, 244
Middlesex	50, 135	19, 488	181	137	6	(5)	41	521	65	60	1, 316
Monmouth	37, 601	14, 704	170	122	5	(5)	39	649	62	109	2, 466
Morris	29, 938	11, 112	107	71	3	(5)	32	334	21	202	1, 212
Passaic [2,3]	64, 048	25, 008	352	222	10	(5)	46	1, 368	159	1, 091	3, 335
Union [2]	78, 164	30, 519	383	247	11	(5)	79	1, 111	110	740	2, 030
Connecticut: Fairfield [3]	100, 853	39, 188	500	265	27	351	99	1, 630	216	533	3, 22
Central cities:											
New York City	1, 435, 478	587, 797	13, 323	7, 498	475	6, 926	1, 200	32, 921	3, 745	19, 475	155, 977
Elizabeth	(4)	(4)	132	80	5	(5)	[6] 18	619	52	0	0
Jersey City	(4)	(4)	245	160	4	(5)	[6] 62	2, 286	221	2, 574	35, 752
Newark	(4)	(4)	651	388	22	(5)	[6] 87	2, 366	352	1, 248	7, 764
Paterson	(4)	(4)	198	105	8	(5)	17	875	101	747	1, 113
Philadelphia district	676, 318	271, 670	3, 794	2, 116	142	(5)	360	14, 387	1, 724	6, 386	76, 743
Counties:											
Pennsylvania: Delaware [3]	82, 445	30, 588	325	207	14	181	35	614	77	274	3, 139
Montgomery	69, 018	26, 429	364	237	13	161	46	1, 007	93	256	1, 604
Philadelphia [3]	421, 187	174, 608	2, 773	1, 438	107	1, 558	203	11, 754	1, 468	5, 464	69, 830
New Jersey: Burlington	22, 817	8, 799	69	54	2	(5)	23	156	0	64	46
Camden [3]	62, 121	23, 985	214	138	6	(5)	40	765	78	304	2, 124
Gloucester	18, 730	7, 261	49	42	0	(5)	13	91	8	24	0
Central city:											
Philadelphia	421, 187	174, 608	2, 773	1, 438	107	1, 558	203	11, 754	1, 468	5, 464	69, 830
Pittsburgh district	553, 357	216, 661	2, 107	1, 316	59	1, 341	210	7, 665	980	3, 261	37, 825
Counties:											
Allegheny [2,3]	324, 805	130, 797	1, 501	836	51	987	178	5, 775	809	2, 925	30, 461
Beaver	44, 134	16, 229	128	101	1	80	7	327	17	142	1, 868
Fayette	53, 693	19, 860	110	86	3	64	7	425	51	64	1, 409
Washington	54, 047	20, 935	154	123	3	84	10	561	55	78	1, 833
Westmoreland	76, 678	28, 840	214	170	1	126	8	577	48	52	2, 254
Central city:											
Pittsburgh	(4)	(4)	1, 015	464	38	639	[6] 45	4, 476	686	2, 423	22, 309

See footnotes at end of table.

Child population (1945); private practitioners, public health nurses, general hospital beds, and community health services for children (1946), by district county, and central city—Continued

District, county, and central city	Child population		Private practitioners				Public health nurses, full time	Beds in general hospitals		Well-child clinic sessions during year	Dental clinic dentist-hours during year [1]
	Under 15	Under 5	Physicians			Dentists		Total	Pediatric		
			Total	General practitioners	Pediatricians						
St. Louis district	349,526	133,427	1,590	813	47	1,032	129	7,290	806	1,668	23,555
Counties:											
Missouri: St. Charles	6,950	2,549	19	15	0	11	0	80	9	0	0
St. Louis	82,829	27,220	105	80	1	88	24	235	25	408	2,155
St. Louis city [2]	174,579	72,271	1,243	540	42	777	81	5,983	637	710	19,312
Illinois: Madison	42,752	15,841	105	88	2	76	4	482	74	91	294
St. Clair [3]	42,416	15,537	118	90	2	80	20	510	61	456	1,794
Central city:											
St. Louis	174,579	72,271	1,243	540	42	777	81	5,983	637	710	19,312
San Francisco-Oakland district	440,460	160,497	2,466	1,165	116	1,716	281	8,846	780	4,725	5,709
Counties:											
Alameda [2] [3]	136,328	52,258	723	374	40	495	50	2,043	194	1,471	0
Contra Costa	63,628	18,366	81	71	3	57	21	429	26	368	391
Marin	13,821	4,787	52	39	3	43	13	149	0	155	114
San Francisco [2]	120,176	52,801	1,218	452	53	882	131	4,530	405	2,078	4,500
San Mateo	34,176	12,054	113	65	6	79	16	384	42	191	0
Santa Clara [3]	45,811	17,222	229	120	10	123	38	921	82	178	635
Solano	26,520	9,009	50	44	1	37	12	390	31	284	69
Central cities:											
San Francisco	120,176	52,801	1,218	452	53	882	131	4,530	405	2,078	4,500
Oakland	(4)	(4)	479	231	24	336	[6] 5	1,647	188	871	0
Washington district	248,099	111,478	1,333	671	69	704	219	5,206	567	4,121	36,509
Counties:											
District of Columbia [2]	148,549	68,767	1,098	502	52	609	166	4,583	523	3,265	33,244
Maryland: Montgomery	28,642	11,695	101	70	5	28	18	142	0	160	1,200
Prince Georges	36,177	13,378	48	41	1	18	13	202	15	129	163
Virginia: Arlington [3]	34,731	17,638	86	58	11	49	22	279	29	567	1,902
Central city:											
Washington	148,549	68,767	1,098	502	52	609	166	4,583	523	3,265	33,244
Total metropolitan county districts	8,374,699	3,337,925	48,123	27,384	1,767	28,270	5,415	156,417	16,878	75,010	616,879
Balance of country	27,631,096	10,671,457	68,672	47,631	1,729	37,414	9,135	306,249	26,206	85,238	352,197
United States	36,005,795	14,009,382	116,795	75,015	3,496	[8] 65,684	14,550	462,266	43,084	160,248	969,076

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[1] Children's clinics only.
[2] Includes central city.
[3] Includes one or more cities of at least 50,000 persons (1940) other than central city.
[4] Not estimated.
[5] Not reported.
[6] Allocation of service between city and balance of county not reported.
[7] Included in New York county.
[8] Includes estimates for New Jersey and Wisconsin.

School Lunches from a Health Standpoint

By Roy E. Butler, M. D.*

This presentation deals with certain aspects of the school lunch study conducted in a community near Washington by the United States Department of Agriculture and a Public Health Service nutrition field unit assigned to the Maryland Department of Health. In this cooperative project, the nutrition field unit was assigned to make the clinical nutritional appraisals, to take the one-day dietary histories, and to perform some of the laboratory work. The unit consisted of a physician, a nutritionist, a biochemist, a nurse, and clerical help. Field units of the Nutrition Branch of the Public Health Service are set up to demonstrate to State and local health departments methods of assessing nutritional status. They apply various known techniques and investigate new ones for local health department use.

The unit attempted to determine whether there is any correlation between an individual's food intake and his laboratory and physical findings. For the experiment, a school serving lunches and a control school were selected. About 340 children between the ages of 6 and 12 were observed in each school for 6 weeks in 1947 and in 1948.

Dietary histories of the children were taken. Whereas the nutritionist of the unit obtained from each child information concerning the food he had eaten during the previous 24 hours, the Bureau of Human Nutrition and Home Economics, Department of Agriculture, recorded the food consumed by the family for one week.[1] The latter placed special emphasis on the foods eaten by the child as reported by the mother. These histories gave some indication of the community dietary patterns when the group results were determined. The results of the analyses of the one-day dietary records will be reported at a later date.

The doctor's rating of the children as to physical appearance did not vary substantially between schools or from one year to the next. Around two-thirds of the youngsters were considered to be in good health, about a third in fair health, and a small percent or practically none in poor health.

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*Senior Surgeon from the Division of Chronic Disease, Public Health Service. Presented before the Food and Nutrition Section and the American School Health Association, Oct. 27, 1949.

[1] The dietary aspects and certain of the laboratory findings are discussed in an article by Dr. Millicent Hathaway submitted for future publication in the American Journal of Public Health. This paper also outlines the characteristics of the schools, the reasons for their selection, and the general procedures followed in an attempt to determine the benefit to the child of a school lunch.

The physical examinations were first made in the control school and then about a month later in the lunch school All physical examinations in 1947 were made by one clinician Another clinician who had observed his methods at that time made the examinations in 1948.

The physical examination for the nutritional appraisal was directed toward the skin, mouth, and eyes, the first areas to show signs of malnutrition. Thirty-nine localized regions were examined and graded for a complete description of these organs. The changes in the various aspects of these organs and tissues were graded from zero, showing the absence of abnormality, through three, which indicated a severe disturbance. Anthropometric measurements were restricted to the determination of height and weight.

The biochemist made examinations of the blood which included determinations for hemoglobin, carotene, and vitamin A. Ascorbic acid determinations were made by the Department of Agriculture.

Results

Physical Examinations

Comparisons of height-weight relationships between the lunch group and the no lunch group failed to reveal any significant difference between the two groups of children.

Thirty of the 39 signs of nutritional deficiency required no further analysis because so few of the children showed evidence of them and then only to a minimal degree. They proved insignificant as a means of evaluating the school lunch program. For this reason the analysis was limited to the following signs and symptoms.

1. General appearance—a subjective impression of the child's outward appearance without reference to grooming or personal hygiene
2. Eyes.
    a. Thickening of the conjunctiva covering the sclera.
    b. Folliculosis—follicular hypertrophy of the palpebral conjunctiva.
    c. Blepharitis—an inflammation of the eyelids extending along the line of the hair follicules; usually no discharge but some scaliness and slight loss of hair. This condition is occasionally associated with a nutritional deficiency but other conditions, such as bacterial infection or visual defects, may also be the cause of the condition.
    d. Outer canthi lesions—redness and scaliness extending from the outer corners of the eyes.
3. Mouth.
    a. Gingivitis—inflammation with various degrees of swelling of the gums along the margins of, and especially between the teeth. Sensitivity to pressure with subsequent bleeding varies with extent of involvement.

b. Tongue fissuring—"cracks" on surface of tongue appearing when extended and gently pushed down with a tongue depressor.

c. Other tongue signs—swelling of the tongue or abnormal appearance of the papillae.

4. Skin.

a. Xerosis and folliculosis—these conditions were recorded separately but were combined for statistical analysis. Xerosis is a dryness of the skin combined with various degrees of roughness. Folliculosis is a "goose-flesh" condition looked for in this examination only on the outer surface of the arms.

The analyses of the nine signs revealed inconsistent differences between the two schools, and from year to year, which indicates that factors more important than the school lunch were affecting the results. In all cases the signs seen were minimal in degree. At the time of the examination the examiners were unaware of the degree of participation of the children in the school lunch program. The comparison of the physical signs obtained in 1947 with those in 1948 is complicated because the examinations were conducted by two different physicians. Studies have shown that even if the same physician examines the same individuals at different periods, considerable variations in the findings may be expected. Also, when examiners of similar training and knowledge of the subject examine the same individuals, a considerable variation in their findings may be expected.

Laboratory

It has been reported that the hemoglobin determinations revealed no evidence of advantage for the children receiving the school meal.[2] It was shown that the blood ascorbic acid values improved in 1948 over 1947 in both schools regardless of participation in the school lunch but improved more markedly for the children who participated both years in the school lunch. This may reflect the use of citrus concentrates which were added to the school lunches in March 1947.

The blood carotene values for any one year were distributed in a manner that indicated that the school lunch group had more individuals in the good group and fewer in the poor group than the no school lunch group. However, in the lunch school in 1948, the children with and without a school lunch showed little difference in carotene values. The blood vitamin A determinations showed little difference between the school lunch and the no school lunch groups.

Discussion

The school health examination did not reveal any significant amount of malnutrition for reasons which will be advanced later. It should be noted that the nutrition appraisal as carried out in this study may fail to uncover defects which affect the physical and emotional health of the individual. There are defects of vision, hearing, diseased tonsils, hernias, and some other conditions which may be present and yet not disturb the nutritional status to an appreciable extent.

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[2] See footnote 1.

The traditional health examination carried out in schools should be broadened to include not only nutritional disturbances but as many factors as possible which influence the complete health of the individual. The examination should attempt to determine the child's freedom from physical, nutritional, mental, and emotional defects. It is obvious that under the present circumstances we cannot expect specialists in each of these fields to examine each child in the school. Each specialty should attempt to provide the school physician with simple screening techniques which permit him to pick out the children requiring further examinations and additional study.

The first reason for the failure to detect any significant amount of malnutrition may be explained by the variability of findings by different observers or even the same observer at different times. It is well to recognize that the evaluation of the physical signs depends largely upon subjective impressions for which we have no adequate comparative standards. In this study the signs were so minimal in degree that the indication of the presence or absence of one might be readily overlooked.

Second, many of the signs which have been described as evidence of the deficiency of specific nutrients are now thought to be less diagnostic than formerly. The tendency grows to consider these signs as evidence of a defect which may or may not be due to malnutrition but, if so, a manifestation resulting from multiple deficiencies. It is to be remembered that clinical nutrition is a young science and suffers from the same growing pains experienced by some of the older sciences. However, careful observance and recording of the defects may be interpreted at a later date with clarity.

The nutritional status of an individual is usually the result of his adherence to some dietary pattern for quite a long period of time. In this study observance of the children for a 6-week period in 2 successive years may not be too indicative of their food practices for the remainder of the time. Also to be taken into consideration are factors such as energy expenditures, emotional disturbances, and community life.

The study of the family dietary pattern revealed it to be fairly good with some exceptions which are common to our population. It might be suggested that the children who went home for lunch or who carried it with them might have had as good a lunch as that provided by the school.

Under such circumstances, the child would very likely bring one or more sandwiches made of enriched bread, butter and cheese, meat or eggs with some lettuce. The lunch box would also contain a fruit and milk. Is it likely that our presently served school lunches are much better than this from a nutritional standpoint?

The school lunch and the no school lunch groups may not be as sharply demarcated as it would first appear. Included in the school lunch group were those who had four or more lunches a week but the no school lunch group included some who had not more than one school lunch a week. This would indicate that the difference between the two groups might not be more than three school lunches a week. Such a small difference would be hard to evaluate especially when it must be considered that the no school lunch children probably had a lunch of some sort.

Third, complete participation in the school lunch program for the entire school year would provide only about 17 percent of the meals for the year. If the no school lunch group were deprived of their lunch entirely it would probably take a considerable period of time before the two groups could be differentiated on a physical basis.

Fourth, the children were in quite good nutritional status in both groups from the beginning of the study. This factor may be one of the most important in the similarity of the two groups and the failure to note an advantage from the school lunch. The extent of the response of an individual to added increments of food is dependent largely upon the severity of the deficiency at the beginning of the supplementation. Severely depleted individuals respond to small supplements of food to a much greater degree than do the well nourished. In this study the amount of the supplement could not be considered as great and the nutritional status was fairly good.

Under certain circumstances the school health examination would be able to differentiate between those who receive a school lunch and those who do not. In attempting to assess the value of the school lunch to health, more dramatic results could be obtained if studies were conducted in a critical area. A base-line study before and follow-ups after the introduction of a school lunch might be expected to show its value to health. Even better would be the selection of two comparable schools in such an area—one with a school lunch and the other without. Under such conditions improvements in the lunch group should be expected, provided the nutritional status of the children was poor at the beginning of the study and a sufficiently long period of evaluation was allowed.

The really important fact to be considered from the standpoint of the health evaluation deals with the total dietary intake over a period of time. Within the family there should be the awareness of the need for a good diet for the greater period of time that the child is not in school and not be lulled into a sense of security because the child is getting a school lunch. It is obvious that in a critical area where the individual dietary intake is low the provision of a good school lunch would be very valuable.

The value of the school lunch as an educational device has not been touched upon, but it would appear to be most important. Certainly the improvement of the dietary pattern should be reflected in improved health. Education in nutrition and health must be a continuing process. It differs very little from learning in other fields.

Incidence of Disease

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

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UNITED STATES

Reports From States for Week Ended July 1, 1950

New cases of acute poliomyelitis reported in the United States for the week ending July 1 numbered 391, a moderate increase over the 336 cases reported for the preceding week. However, the number is lower than the 481 cases reported for the corresponding week last year. Also, the cumulative total of 2,053 cases for the current "disease" year is below the corresponding total for last year (2,271), although well above the median of 1,385 for the same period during the last 5 years. The "disease" year for poliomyelitis begins with the twelfth week of the calendar year.

Moderate increases over the preceding week were reported for the Middle Atlantic, East North Central, South Atlantic, East South Central, and West South Central States. Little change was indi-

Comparative Data for Cases of Specified Reportable Diseases: United States

[Numbers after diseases are International List numbers, 1948 revision]

Disease	Total for week ended		5-year median 1945–49	Seasonal low week	Cumulative total since seasonal low week		5-year median 1944–45 through 1948–49	Cumulative total for calendar year		5-year median 1945–49
	July 1, 1950	July 2, 1949			1949–50	1948–49		1950	1949	
Anthrax (062)	4	2	(1)	(1)	(1)	(1)	(1)	24	33	(1)
Diphtheria (055)	58	72	149	27th	7,338	8,802	13,731	3,067	3,688	6,165
Acute infectious encephalitis (082)	22	12	10	(1)	(1)	(1)	(1)	366	269	231
Influenza (480–483)	643	511	511	30th	274,641	110,455	179,841	244,111	74,185	136,283
Measles (085)	7,940	8,006	8,006	35th	284,538	621,264	552,242	265,408	568,871	517,296
Meningococcal meningitis (057.0)	72	48	50	37th	[2] 3,192	2,836	3,080	[2] 2,279	1,992	2,108
Pneumonia (490–493)	1,102	933	------	(1)	(1)	(1)	(1)	55,309	50,103	-------
Acute poliomyelitis (080)	391	481	273	11th	2,053	2,271	1,385	3,187	3,186	1,852
Rocky Mountain spotted fever (104)	22	32	26	(1)	(1)	(1)	(1)	169	238	175
Scarlet fever (050)	487	456	637	32d	54,756	78,604	85,644	38,317	56,060	58,958
Smallpox (084)	------	------	1	35th	[3] 43	50	194	[3] 23	40	140
Tularemia (059)	15	28	27	(1)	(1)	(1)	(1)	511	640	514
Typhoid and paratyphoid fever [4] (040, 041)	94	80	108	11th	912	863	997	1,422	1,351	1,470
Whooping cough (056)	2,289	1,241	2,152	39th	90,721	37,505	81,382	69,185	27,471	50,116

[1] Not computed. [2] Deduction: Arkansas week ended Mar. 4, 1 case. [3] Deduction: Arizona week ended June 17, 1 case. [4] Including cases reported as salmonellosis.

cated for the New England and West North Central States, while the Mountain and Pacific States reported decreases. States reporting 15 or more cases are as follows: Texas 124, New York 27, Oklahoma 25, California 22, South Carolina 17, and Louisiana 15.

Reported cases of meningococcal meningitis for the week numbered 72 compared with 73 for the preceding week, 48 for the corresponding week last year, and a 5-year median of 50. The cumulative total for the current calendar year is 2,279 compared with the 5-year median of 2,108 cases.

The number of cases of acute infectious encephalitis reported for the week was 22, compared with 27 cases for the preceding week, and the 5-year median, 10, for the corresponding week. The cumulative total of reported cases during the present calendar year is 366, which may be compared with the corresponding figure of 269 for 1949 and 231 for the 5-year median for the same period.

The total number of reported cases of influenza for the week was 643 as compared with 619 last week and 511 for the corresponding week last year. The 5-year (1945–49) median is 511. The cumulative figure for the first 26 weeks of the year is 244,111, compared with 74,185 for the corresponding period last year. The 5-year median is 136,283.

Reported cases of Rocky Mountain spotted fever numbered 22 for the week, 13 of which were in the South Atlantic States. For the corresponding week last year, 32 cases were reported.

Four cases of anthrax were reported, three of which occurred in Pennsylvania. No cases of smallpox were reported for the current week.

Deaths During Week Ended July 1, 1950

	Week ended July 1, 1950	*Corresponding week, 1949*
Data for 94 large cities of the United States:		
Total deaths	8, 932	8, 978
Median for 3 prior years	8, 963	----------
Total deaths, first 26 weeks of year	248, 963	246, 775
Deaths under 1 year of age	658	686
Median for 3 prior years	646	----------
Deaths under 1 year of age, first 26 weeks of year	16, 175	16, 853
Data from industrial insurance companies:		
Policies in force	69, 739, 298	70, 356, 854
Number of death claims	11, 795	12, 139
Death claims per 1,000 policies in force, annual rate	8. 8	9. 0
Death claims per 1,000 policies, first 26 weeks of year, annual rate	9. 8	9. 5

Reported Cases of Selected Communicable Diseases: United States, Week ended July 1, 1950

[Numbers under diseases are International List numbers, 1948 revision]

Area	Diphtheria (055)	Encephalitis, infectious (082)	Influenza (480–483)	Measles (085)	Meningitis, meningococcal (057. 0)	Pneumonia (490–493)	Poliomyelitis (080)
United States	**58**	**22**	**643**	**7, 940**	**72**	**1, 102**	**391**
New England	**5**	**4**	--------	**960**	**3**	**21**	**7**
Maine	3	--------	--------	7	--------	2	1
New Hampshire	--------	--------	--------	8	--------	--------	--------
Vermont	--------	--------	--------	6	--------	--------	--------
Massachusetts	2	4	--------	754	1	--------	3
Rhode Island	--------	--------	--------	1	1	4	--------
Connecticut	--------	--------	--------	184	1	15	3
Middle Atlantic	**3**	**6**	--------	**2, 472**	**17**	**178**	**45**
New York	--------	3	(1)	1, 080	9	126	27
New Jersey	--------	3	--------	697	2	23	7
Pennsylvania	3	--------	--------	695	6	29	11
East North Central	**3**	**2**	**8**	**2, 433**	**9**	**130**	**31**
Ohio	--------	--------	--------	668	3	21	4
Indiana	--------	--------	--------	87	--------	2	3
Illinois	--------	1	--------	602	4	56	9
Michigan	3	1	--------	308	1	48	10
Wisconsin	--------	--------	8	768	1	3	5
West North Central	**2**	**2**	**3**	**210**	**4**	**92**	**19**
Minnesota	1	1	2	44	1	18	2
Iowa	--------	--------	--------	37	1	--------	3
Missouri	--------	--------	1	50	1	20	2
North Dakota	--------	--------	--------	2	--------	46	--------
South Dakota	--------	1	--------	9	1	--------	--------
Nebraska	--------	--------	--------	42	--------	--------	4
Kansas	1	--------	--------	26	--------	8	8
South Atlantic	**10**	**1**	**155**	**260**	**11**	**335**	**48**
Delaware	--------	--------	--------	18	--------	--------	1
Maryland	--------	--------	6	42	2	38	1
District of Columbia	--------	--------	--------	35	--------	13	3
Virginia	3	--------	62	66	1	22	8
West Virginia	--------	--------	9	10	--------	7	4
North Carolina	1	--------	--------	37	4	--------	4
South Carolina	3	--------	18	11	--------	5	17
Georgia	2	1	60	7	4	247	4
Florida	1	--------	--------	34	--------	6	6
East South Central	**5**	**1**	**14**	**144**	**6**	**26**	**42**
Kentucky	1	--------	--------	57	2	7	14
Tennessee	2	1	9	57	4	--------	11
Alabama	1	--------	1	11	--------	14	6
Mississippi	1	--------	4	19	--------	5	11
West South Central	**23**	**5**	**383**	**326**	**12**	**249**	**168**
Arkansas	2	--------	26	37	2	2	4
Louisiana	2	--------	2	16	1	39	15
Oklahoma	2	--------	11	8	1	23	25
Texas	17	5	344	265	8	185	124
Mountain	**1**	--------	**75**	**610**	**2**	**20**	**8**
Montana	--------	--------	13	14	--------	--------	--------
Idaho	--------	--------	--------	62	--------	--------	3
Wyoming	--------	--------	--------	2	--------	1	--------
Colorado	1	--------	4	284	1	6	2
New Mexico	--------	--------	--------	7	--------	1	1
Arizona	--------	--------	55	26	1	10	1
Utah	--------	--------	3	214	--------	1	1
Nevada	--------	--------	--------	1	--------	1	--------
Pacific	**6**	**1**	**5**	**525**	**8**	**48**	**23**
Washington	1	--------	--------	92	1	--------	1
Oregon	--------	--------	4	6	1	15	--------
California	5	1	1	427	6	33	22
Alaska [2]	--------	--------	--------	--------	--------	--------	--------
Hawaii	1	--------	--------	1	1	--------	1

[1] New York City only.
[2] Report not received.

Anthrax: Pennsylvania 3, Colorado 1.

Reported Cases of Selected Communicable Disease: United States, Week ended July 1, 1950—Continued

[Numbers under diseases are International List numbers, 1948 revision]

Area	Rocky Mountain spotted fever (104)	Scarlet fever (050)	Smallpox (084)	Tularemia (059)	Typhoid and paratyphoid fever (040, 041)[1]	Whooping cough (056)	Rabies in animals
United States	22	487		15	94	2,289	137
New England		76			1	261	
Maine		4				47	
New Hampshire							
Vermont		2				20	
Massachusetts		60			1	81	
Rhode Island		2				44	
Connecticut		8				69	
Middle Atlantic		131			6	238	30
New York		[2] 93			5	101	27
New Jersey		11			1	50	
Pennsylvania	1	27				87	3
East North Central		129		2	2	438	32
Ohio		67			1	172	2
Indiana		1				8	18
Illinois		16		2		18	3
Michigan		28			1	150	8
Wisconsin		17				60	1
West North Central		10			6	153	18
Minnesota					2	14	
Iowa		2				30	8
Missouri		5			1	49	
North Dakota						15	
South Dakota						6	
Nebraska						12	
Kansas		3			3	27	10
South Atlantic	13	25		2	36	309	15
Delaware		2			1	5	
Maryland	4	8			2	34	
District of Columbia		1				4	
Virginia	2	5			2	75	2
West Virginia	1	2				45	2
North Carolina	5	5		1	8	115	
South Carolina	1	1			20	14	
Georgia		1		1	3	14	11
Florida						3	
East South Central	2	16		1	8	107	18
Kentucky	1	2			3	23	10
Tennessee	1	9		1		64	1
Alabama		1			3	12	5
Mississippi		4			2	8	2
West South Central		20		8	28	461	17
Arkansas		2		4	4	77	
Louisiana		2		1	6	3	
Oklahoma		3		2	3	51	1
Texas		13		1	15	330	16
Mountain	6	16		2		120	6
Montana	1	2		2		5	
Idaho		2				17	
Wyoming	1						
Colorado	2	3				19	6
New Mexico	1	1				20	
Arizona		3				36	
Utah	1	2				21	
Nevada		3				2	
Pacific		64			7	202	1
Washington		6				38	
Oregon		7				77	
California		51			7	87	1
Alaska [3]							
Hawaii						1	

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[1] Including cases reported as salmonellosis.
[2] Including cases reported as streptococcal sore throat.
[3] Report not received.

FOREIGN REPORTS

CANADA

Reported Cases of Certain Diseases—Week Ended June 17, 1950

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Brucellosis					7	2			1		10
Chickenpox			12	2	140	310	18	20	59	99	660
Diphtheria						1					1
Dysentery, bacillary					4	1	1			2	8
Encephalitis, infectious								1			1
German measles			23		8	1,086	2	85	107	248	1,559
Influenza			15			10	11				36
Measles			2		305	595	26	21	32	157	1,198
Meningitis, meningococcal					1	3				1	5
Mumps			17		129	340	6	51	134	96	773
Poliomyelitis						1				2	3
Scarlet fever	13		3	1	53	23		5	32	13	143
Tuberculosis (all forms)	22		9	35	100	23	13	11	3	49	265
Typhoid and paratyphoid fever	2			2	6	2				6	18
Venereal diseases:											
Gonorrhea	6		5	3	71	30		15	40	(1)	170
Syphilis	5		7	4	48	13		4	3	(1)	84
Whooping cough	2		20	1	105	37	3	10	2	60	240

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[1] Report for the period not received.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India. During the week ended June 24, 1950, 260 cases of cholera were reported in Calcutta, and 12 cases in the airport of Delhi.

Indochina (French). One fatal case of cholera was reported in the rural area of Soctrang, Viet Nam, during the week ended June 17, 1950.

Pakistan. During the week ended June 27, 1950, 9 cases of cholera, with 4 deaths, were reported in Chittagong.

Plague

Ecuador. During the period May 1–15, 1950, two cases of plague with one death were reported at Malobog, Riobamba County, Chimborazo Province.

Smallpox

Argentina. During the month of April 1950, 158 cases of smallpox were reported in Argentina. The highest incidence was reported in San Juan Province (58 cases) and Rio Negro Territory (28 cases).

Belgian Congo. Eighty-seven cases of smallpox were reported in Belgian Congo during the week ended June 3, 1950.

French West Africa. For the period May 21–31, 1950, 112 cases of smallpox were reported in Niger Territory.

Greece. During the period May 17–23, 1950, 11 cases of smallpox (including 6 suspected cases), with 2 deaths, were reported in Attica Department.

Indonesia. During the week ended June 17, 1950, 185 cases of smallpox were reported in Surabaya, Java, and 51 cases in Pontianak, Borneo.

Mexico. For the week ended June 17, 1950, eight cases of smallpox were reported in Mexico City, and five in Guadalajara.

Nigeria. During the week ended May 20, 1950, 349 cases (47 deaths) of smallpox were reported in Nigeria. For the weeks ended May 6 and May 13, 489 and 442 cases were reported, respectively. In the port of Lagos 8 cases (3 deaths) were reported for the week ended May 20. For the two previous weeks, 14 and 8 cases were reported.

Typhus Fever

Japan. Cases of typhus fever have been reported in ports in Japan as follows: Weeks ended May 6, 1950, Tokyo 2, Hyogo 8; May 13, Osaka 2; June 10, Nagasaki, 1; June 17, Otaru 2; June 24, Nagasaki 1, and Tokyo 1.

Turkey. Thirteen cases of typhus fever were reported in Turkey during the month of April 1950, and 21 cases during the month of May.

Yellow Fever

Sierra Leone. On June 9, 1950, one suspected case of yellow fever was reported in Koinadugu District.

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The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

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Public Health Reports

VOLUME 65 JULY 28, 1950 NUMBER 30

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Visual Identification of V and W Form Colonies

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INCIDENCE OF DISEASE

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Public Health Reports

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Effect of Formaldehyde on the Direct Microscopic Count of Raw Milk

By B. S. Levine, Ph. D.*

The addition of formaldehyde to milk samples intended for direct microscopic examination has never been included in Standard Methods as an explicitly recommended procedure. In the eighth edition of Standard Methods (*1*) the following statements appear: "Icing of samples may be omitted where chemical preservatives are used; for example, a drop of a 40 percent formaldehyde solution to each 10 ml. of milk in the sample bottle. Add the preservative either to the milk as the sample is taken or to the empty containers a few hours before use." In 1944 Robertson (*2*) made a preliminary study of formaldehyde-preserved milk samples, because, as he stated: "Some workers have questioned the desirability of adding formaldehyde to milk samples at the time of sampling . . ." and because of ". . . the alleged failure of the bacteria in the formaldehyde-treated milk to take the methylene blue stain so that they could be counted, using the direct microscopic methods."

The basic observations made by Robertson are worthy of being quoted at some length: ". . . the micro-appearance of the films suggests a formaldehyde-casein complex which is so porous that it permits the dye to penetrate irregularly and more deeply into the milk solids. The formaldehyde-casein complex apparently retains larger portions of the fat than is retained in films prepared from nonformaldehyde-preserved samples. Once the dye has penetrated the interstices, it is not so readily removed by washing or destaining, and consequently the intensity of the retained blue color increases the difficulty of identifying bacterial cells. This difficulty is so great as to make the satisfactory examination of smears made from formaldehyde-preserved samples, at least in some cases, a practical impossibility."

The observations of Robertson may have been largely responsible for the fact that reference to the use of formaldehyde as a preservative for milk samples to be studied by the direct microscopic procedure has been deleted from the ninth edition of Standard Methods for the Examination of Dairy Products (*3*). Despite this deletion, however, occasional inquiries are received concerning the proper procedure to be followed in preserving milk samples by the addition of formaldehyde. Such inquiries indicate that in some State and municipal laboratories the preservation of milk samples seems necessary. For this reason, the author has studied the effect of formaldehyde on the direct microscopic count in greater detail than is reported by Robertson.

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*Bacteriologist, Public Health Service, Environmental Health Center, Cincinnati, Ohio. This report amplifies remarks presented before the Ohio Branch, Society of American Bacteriologists, Columbus, Ohio, Dec. 3, 1949.

Procedure

Raw milk samples were collected early in the morning as deliveries were being made at the receiving platforms of milk plants. Collections were made in 50 ml. sterile sample bottles. They were brought promptly to the laboratory iced as prescribed in Standard Methods. As controls, two series of untreated milk films were prepared in triplicate on 1″ x 3″ glass slides to be stained as described later. Varying strengths of commercial or U.S.P. formalin (40 percent formaldehyde) were then added to sets of sterile vials as follows:

Set No. 1—0.1 ml. of ½ strength formalin, equivalent to 0.2 percent formaldehyde concentration after the addition of 10 ml. of the milk.

Set No. 2—0.1 ml. of ⅕ strength of the original formalin, constituting 0.08 percent formaldehyde concentration on the basis of 10 ml. of the milk.

Set No. 3—0.1 ml. of 1/10 strength of commercial formalin, constituting 0.04 percent formaldehyde concentration.

Set No. 4—0.1 ml. of 1/20 strength of formalin, constituting 0.02 percent of formaldehyde on the basis of 10 ml. of the milk sample.

Upon the addition of the 10 ml. of the corresponding milk samples to the vials containing 0.1 ml. of the desired strength of formalin, they were shaken 30 times to insure proper distribution of the formaldehyde in the milk. Two series of triplicate milk film slides were prepared from each of the four sets at time intervals indicated in the following paragraphs. One series of the milk film slides was stained with the optional Standard Methods stain, containing 30 ml. of 95 percent ethanol, denoted hereafter as the A-M-B stain (alcohol-containing methylene blue). The other series was stained with the acid- and water-free stain, denoted hereafter as the A-W-F stain.[1]

Effect of 0.2 Percent Formaldehyde Concentration

As stated, a 0.2 percent formaldehyde concentration is obtained when 0.1 ml. of ½ strength or 0.05 ml. full strength commercial formalin is added to 10 ml. of milk. Since a drop is roughly equivalent to a minim, or 1/20 ml., a 0.2 percent concentration of formaldehyde is practically the same as that obtained by adding 1 drop of the full strength formaldehyde to 10 ml. of milk, as was mentioned in the eighth edition of Standard Methods. Two series of triplicate film slides were made of this set of milk samples prior to the addition of the formaldehyde and at the following time intervals after the addition of the formaldehyde: (1) within 2 hours, (2) after 3 days, and (3) after 8 days storing at room temperature. One series was stained by the optional Standard Methods formula; the other series was stained by the A-W-F staining procedure. A minimum of 30 microscopic fields in each of the triplicate films was counted for each milk sample studied. The final numerical estimates recorded in any of the following tables thus represent an average of not less than 90 fields counted over three separate milk films.

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[1] The significance of the data as originally obtained was determined by statistical analysis made by John S. Wiley, Senior Sanitary Engineer of the Environmental Health Center, to whom the author expresses his grateful acknowledgment.

The effect of 0.2 percent formaldehyde concentration on the general microscopic appearance of the stained milk films has been aptly and correctly described by Robertson. A few points from additional observations should perhaps be recorded here. There appeared a general tendency for the milk proteins to stain more intensely, and for the organized cells, especially the bacteria, to stain considerably less intensely than in the untreated milk. In films stained by the optional Standard Methods stain, cracks extending in an astral formation around the fat-removed vacuoles were prominently in evidence and enhanced the difficulty in counting tbe milk films. These effects of 0.2 percent formaldehyde on the stained milk films became evident within 2 hours of the addition of the chemical. They became more pronounced as the storage time was prolonged. At the end of 8 days it became extremely difficult to make the counts, and about 35 to 40 percent of the stained films could not be counted. For films stained by the A-W-F procedure such effects were markedly reduced, but they were still of sufficient magnitude to prevent proper counting of stained cells. Averages of triplicate counts made on such a set of 30 milk samples are presented in table 1. Values derived for the mean, the standard error of mean, and the interpretation of the significance of difference between means are presented at the end of each column and between corresponding columns of table 1. The interpretation in terms of not significant, high, and very high are considered self-explanatory.

It seemed desirable to determine the effect which counts obtained on milk samples to which formaldehyde was added to a final concentration of 0.2 percent may have upon practical grade placement of milk. For this purpose the data presented in table 1 were analyzed on the basis of the number of milk samples yielding direct counts of 200,000 or less per ml., as is shown in table 2. In the untreated condition of the 30 samples, 8, or 26.7 percent, gave counts of 200,000 or less by the A-M-B stain. By the A-W-F stain only two samples, or 6.7 percent, gave counts of 200,000 or less. Within 2 hours after

Table 1. *Effect of 0.2 percent formaldehyde on the direct microscopic count of the raw milk: Average counts, in thousands, of three milk films per specimen (counting 30 microscopic fields per film)*

Specimen No.	Standard alcohol-containing methylene blue stain				Acid-and-water-free methylene blue stain			
	Untreated, stained immediately	Formaldehyde added, stained after			Untreated, stained immediately	Formaldehyde added, stained after		
		2 hours	3 days	8 days		2 hours	3 days	8 days
1	190	180	190	Unreadable	390	350	270	190
2	370	240	230	180	420	440	390	480
3	300	300	300	Unreadable	430	410	350	350
4	530	580	510	100	760	600	580	430
5	150	150	110	80	200	210	150	220
6	200	100	120	50	490	390	300	240
7	230	160	160	Unreadable	450	350	270	120
8	200	180	120	Unreadable	400	240	320	170
9	280	170	180	50	370	350	300	170
10	240	190	100	70	400	340	300	100
11	550	550	280	150	610	610	380	280
12	320	320	110	Unreadable	300	220	120	100
13	700	320	210	120	680	600	230	140
14	370	260	190	50	490	470	240	140
15	460	290	230	Unreadable	490	350	340	140
16	260	230	50	Unreadable	570	280	90	100
17	650	620	100	130	760	640	260	240
18	1, 200	960	230	Unreadable	1, 500	980	470	100
19	440	360	70	80	470	400	230	130
20	2, 300	2, 300	660	600	2, 400	2, 300	2, 000	1, 700
21	180	130	30	50	350	330	80	80
22	510	440	200	150	720	700	260	230
23	820	570	190	160	980	900	370	500
24	370	310	80	50	500	300	130	100
25	370	330	15	80	490	410	170	90
26	200	70	40	Unreadable	300	260	120	100
27	190	70	40	40	180	160	120	80
28	220	100	80	70	230	220	190	180
29	180	90	90	80	290	260	150	140
30	260	170	100	70	300	280	250	200
Mean	441. 3	358. 0	167. 2	114. 8	564. 0	478. 3	314. 3	241. 3
Standard error of mean	76. 5	76. 2	25. 2	25. 7	79. 3	72. 5	61. 8	54. 3
Significance of difference between means		not significant	very high	very high		not significant	high	very high

the addition of the 0.2 percent formaldehyde, the number of milk samples yielding such counts by the A-M-B stain was 13, or 43.3 percent. The number in the A-W-F stained samples remained essentially unchanged. After 3 days' storage of the formaldehyde-preserved milk samples, the number yielding direct counts of 200,000 or less was 22, or 73.3 percent, by the A-M-B stain and 10, or 33.3 percent, by the A-W-F stain. As in our preceding investigations (*5*) the A-W-F stain proved superior to the A-M-B stain. It must be emphatically stated, however, that the counting of stained formaldehyde-treated milk films was considerably more difficult than counting similarly stained films in the control or untreated series.

The analysis presented in table 2 clearly shows that the addition of 0.2 percent formaldehyde may result in classifying milk of inferior quality as grade A. As previously stated, such concentration of formaldehyde is equivalent to the concentration obtained when one drop of full strength formaldehyde is added to 10 ml. of milk. It would, therefore, not be out of place to express the following opinion at this point: The deletion from the ninth edition of Standard Methods of reference to the addition of one drop of full-strength formaldehyde to 10 ml. of milk appears to be well-considered and appropriate.

Table 2. *Effect on grading by direct microscopic counts of raw milk preserved by 0.2 percent formaldehyde*

	Total samples examined	Samples with counts of 200,000	
		Number	Percent
Standard alcohol-containing methylene blue stain:			
Untreated, stained immediately	30	8	26.7
Treated and stained in 2 hours	30	13	43.3
Treated and stained after 3 days	30	22	73.3
Acid- and water-free stain:			
Untreated, stained immediately	30	2	6.7
Treated and stained in 2 hours	30	2	6.7
Treated and stained after 3 days	30	10	33.3

Effect of 0.08 Percent Formaldehyde Concentration

A concentration of an 0.08 percent formaldehyde in milk was obtained by adding to a vial 0.1 ml. of ⅕ dilution of commercial or U.S.P. formalin (containing 40 percent formaldehyde) to which was then added 10 ml. of milk. Although a regrettably small number of milk samples was studied, the constancy of the results obtained, as recorded in table 3, appears highly encouraging. The unfavorable effects noted with 0.2 percent formaldehyde appeared in a far less pronounced manner. The differentiation between background and stained cells could be made reliably even after 8 days of storage at room temperature. It must be stated, however, that the counting of milk films so treated and stained required a greater degree of concentration and resulted in greater eye strain. Here again, the A-W-F stain was superior. It is possible, however, that some microscopists may prefer the darker appearance of the A-M-B stained films even though they tend to cause greater eye fatigue than the A-W-F stained milk films.

The values of the means and standard error of mean indicate that there is no statistically significant difference between the means in any two columns where either A-M-B or A-W-F stain is used. It is also apparent from this table that actual counts by the A-W-F stain were of greater magnitudes than the counts obtained by the A-M-B stain.

On the basis of the data presented in table 3, it is suggested (though not recommended) that if it is necessary to add formaldehyde to preserve milk samples for direct microscopic counts, it be done on the basis of adding 0.1 ml. of ⅕ dilution of U.S.P. formalin to 10 ml. of the milk sample. It is hoped that other workers interested in the preservation of milk samples for study by the direct microscopic method will try to verify the results obtained here with an 0.08-percent concentration of formaldehyde in milk as reported in table 3.

Table 3. *Effect of 0.08 percent formaldehyde on the direct microscopic count of raw milk: Average counts, in thousands, of three milk films per specimen (counting 30 microscopic fields per film)*

Specimen No.	Standard alcohol, containing methylene blue stain					Acid- and water-free methylene blue stain				
	Untreated, stained immediately	Formaldehyde added, stained after				Untreated, stained immediately	Formaldehyde added, stained after			
		2 hours	1 day	3 days	8 days		2 hours	1 day	3 days	8 days
1	190	180	140	160	300	300	420	320	360	360
2	650	850	750	750	830	880	1, 130	1, 150	1, 450	1, 600
3	1, 550	1, 550	1, 400	1, 500	1, 600	2, 300	2, 000	1, 900	1, 900	2, 000
4	650	760	830	840	720	800	710	730	740	660
5	320	300	300	300	400	360	400	430	300	470
6	320	270	220	330	300	430	460	470	480	470
7	400	550	700	510	360	720	650	630	320	420
8	400	270	350	300	300	360	360	430	320	400
9	600	430	400	300	270	530	520	510	530	300
10	360	320	310	310	310	450	400	400	400	450
Mean	544. 0	548. 0	540. 0	530. 0	539. 0	713 0	705. 0	697. 0	680. 0	713. 0
Standard error of mean	121. 6	131. 6	121. 2	127. 8	133. 0	187. 3	161. 3	153. 4	174. 2	186. 0

NOTE: There is no statistically significant difference between the means in any two columns where either A-M-B or A-W-F stain is used.

Effect of 0.04 and 0.02 Percent Formaldehyde Concentration

Reasoning from the previously reported results that a further reduction in the formaldehyde concentration might disclose a point at which suitable preservation conditions for milk samples could be arrived at, met with obstacles which might have been anticipated. It has been known for some time that bacterial species exist which not only grow but thrive in surprisingly high concentrations of formaldehyde. Recently Thompson and Dodd (*6*) worked with strains of *C. diphtheriae* which could not survive an initial 0.06 percent formaldehyde concentration. By a procedure of successive transfers to increasing concentrations of formaldehyde, they were able to develop a high degree of tolerance, so that the strains were able to grow well in as high a formaldehyde concentration as 0.1 percent. None of the resistant strains, however, could be cultivated in the presence of 0.2 percent formaldehyde.

With specific reference to the study under discussion, the following interesting and important observations were made. Two sets consisting of 25 milk samples each were studied. To one set 0.1 ml. of $\frac{1}{10}$ dilution and to the other set 0.1 ml. of $\frac{1}{20}$ dilution of formalin were added for every 10 ml. of the milk samples, making final formaldehyde concentrations of 0.04 percent and 0.02 percent, correspondingly. A survey of the microscopic counts made on milk films prepared after 2 days of storing the treated samples at room temperature disclosed that in the majority of the milk samples there occurred a sudden falling off in the counts with both the A-M-B and A-W-F stains. In a few milk samples, however, the number of individual bacteria per micro-field was in excess of 200—more than there were originally. It was also observed that the originally seen types of heavily stained bacteria practically disappeared and that the now predominating lightly stained bacteria represented new and progressive growth occurring during the time of storage.

A study of milk films stained 4 days after storage at room temperature confirmed the previously recorded observations. In this instance, the number of specimens with progressively increasing counts was as high as 25 percent. None of the milk samples, however, showed any casein curds nor any marked thickening of the milk sample. Eight days following the addition of 0.04 and 0.02 percent of formaldehyde, 35 percent of the milk samples curdled, and the number of lightly stained, mostly spore-forming bacteria was beyond any possible counting. In those samples where curdling or thickening of the milk did not take place, the number of heavily stained bacteria was reduced to only a few, totaling not more than about 30 per ml. of the treated milk.

Further observations and preliminary studies for the purpose of obtaining a clue to the mechanisms of action leading to the above-reported phenomena indicated that the explanation may be a rather simple one. The progressive growth appeared to be due to the presence in the original milk samples of formaldehyde resistant species of bacteria, presumably of the thermophilic and thermoduric types of spore-forming and nonspore-forming variety. Preliminary experiments with differential stains suggested the possibility of the following effects of formaldehyde on other bacteria normally occurring in milk. The formaldehyde concentration apparently was strong enough to alter the permeability of bacterial surface and thereby impeded the processes of metabolism. However, the concentration apparently was not strong enough to penetrate into the cytoplasm of the bacteria. Reproductiveness was arrested, but the endoenzymes and other endogenous digestive agents remained unimpaired. Autolysis set in, and the bacteria disintegrated at a rapid rate. As applied to the direct microscopic counts, it can be stated that the two concentrations of formaldehyde studied were definitely too low for practical purposes of preservation.

Summary

The effect of several concentrations of formaldehyde on the direct microscopic counts of raw milk were studied. It was noted that in

concentration of 0.2 percent or more the milk proteins of the background became brittle, showed an unevenness of spread, and acquired a higher affinity for the methylene blue dye. All cells, especially bacteria, lost in their power to adsorb the dye. This effect became evident within 2 hours of the addition of the formaldehyde. At the end of 3 and especially 8 days of storage at room temperature, these unfavorable effects became predominant. The direct counts either could not be made or their values were seriously impaired.

With concentrations of 0.08 percent formaldehyde, it appeared possible to make dependable direct counts after as long a period as 8 days storage at room temperature. However, the microscopic study of such milk films required a greater concentration on the part of the microscopist and consequently caused more rapid eye fatigue.

In concentration of 0.04 percent, formaldehyde-resistant bacteria rapidly proliferated, while bacteria normally occurring in raw milk rapidly disappeared.

Conclusions

1. The addition of one drop of full strength formalin for every 10 ml. of raw milk rapidly results in lowered direct microscopic counts. This procedure should not be resorted to even in instances of great emergency.

2. Where it is necessary to preserve milk samples, and in the absence of more appropriate methods of preservation, the results here reported indicate that 0.1 ml. of ⅙ dilution of formalin (40 percent formaldehyde) be added for every 10 ml. of milk, making a final 0.08 percent formaldehyde concentration.

3. Concentrations of formaldehyde appreciably below 0.08 percent should not be used to preserve raw milk for direct microscopic counts.

4. Formaldehyde is not the ideal preservative for milk samples intended for direct microscopic examination.

REFERENCES

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Field Tests of Molluscacides Against *Australorbis glabratus* in Endemic Areas of Schistosomiasis in Puerto Rico

By E. G. Berry,* M. O. Nolan,* and J. Oliver González †

Schistosomiasis has been recognized as a disease of world-wide importance even though it is not universal in its distribution. Certainly, with the philosophy of the economic interdependence of nations in mind it must be realized that a disease which hinders the economic development of such a country as Egypt, where schistosome infection is the most serious public health problem (*1*), adversely affects countries geographically remote from its focus. Moreover, with the changing conditions of travel, it becomes increasingly possible that new foci of the disease may be established.

Despite the fact that copper sulfate has been reported to be an effective molluscacide, the use of this compound over a period of many years has not resulted in adequate control of schistosomiasis. Reasons for this may be failure to apply adequate concentrations of chemical, and the ability of organic materials and plant life in treated waters to bind the available copper. The need for molluscacides of greater efficacy has been, therefore, increasingly recognized.

Within recent years, efforts have been made by several investigators to develop molluscacides for the destruction of the snail intermediate hosts of the human schistosomes. Reports of such investigations include those of Halawani (*2, 3*), Stirewalt and Kuntz (*4, 5*), McMullen and Graham (*6*), McMullen et al. (*7*), Pesigan and Masiluñgan (*8*), Jachowski and Stirewalt (*9*), and McMullen et al. (*10*). The most extensive field tests have been conducted by McMullen et al. (*10*) in Japan and have resulted in the finding that sodium pentachlorophenate and dinitro-*o*-cyclohexylphenol or its dicyclohexylamine salt were the most effective of all chemicals tested for the control of *Oncomelania nosophora,* the intermediate host of *Schistosoma japonicum.*

In the Laboratory of Tropical Diseases, Nolan and Mann (report to be published) have been engaged for several years in screening chemicals in an effort to develop more effective molluscacides. *Australorbis glabratus,* the intermediate host of *Schistosoma mansoni* in parts of the Western Hemisphere, has been employed in these tests. On the basis of some of these tests, certain promising compounds were tried in field tests in the vicinity of Brownsville, Tex., in January 1949 by Nolan and Berry (*11*). These field studies were made on *Tropicorbis obstructus donbilli*, which is not an intermediate host of *Schistosoma mansoni* but which is closely related to *Australorbis glabratus*. Of necessity these field tests were made only in standing waters. Of the dozen compounds tested, pentabromophenol and sodium pentachlorophenate showed promise of being good molluscacides.

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Further screening tests of other chemicals have been made in the Laboratory of Tropical Diseases since these first field tests were performed. Several additional compounds were found to kill *A. glabratus* within 24 hours in dilutions of 10 ppm or less. It was decided that these should be tested in the field and additional studies made on pentabromophenol and sodium pentachlorophenate in an endemic area of schistosomiasis and under a variety of aquatic conditions. Consequently, arrangements were made for conducting the tests in Puerto Rico.

Australorbis glabratus Say is widely distributed throughout Puerto Rico and is found, generally in large numbers, in many different types of aquatic environment such as streams, irrigation ditches, swamps, and lakes, whether relatively clear or grossly polluted. It is the largest planorbid species found in the island and is the only species known to serve as the intermediate host of *Schistosoma mansoni* in Puerto Rico. In areas where human pollution is present and this species of snail is found, the possibility of schistosomiasis is always a potential problem.

Materials and Methods

The compounds selected for field studies were chosen from among more than 750 chemicals which have been screened in the laboratory tests. The techniques of the screening procedures and the data regarding these studies are now in manuscript (Nolan and Mann). No attempt was made in the laboratory to simulate conditions that might prevail in natural waters; the compounds were tested in aqueous solutions uninfluenced by such variable factors as soil or mud, aquatic vegetation, or organic content. Dechlorinated tap water was used. It was borne in mind that the final evaluation of the compounds as molluscacides would have to be made in the field under the diverse conditions that would be encountered in widely separated areas. In the laboratory, compounds that were 100 percent effective against *A. glabratus* within a 24-hour period were arbitrarily considered to be of high potency and promising for field trial. Table 1 gives the name, structural formula, and source of the compounds which were employed in the field tests. Table 2 presents results obtained with these same chemicals in the laboratory screening tests.

Mammalian toxicity tests had been made on only three of these compounds. Therefore, to avoid risk to man and domestic animals,

Table 1. *Name, structural formula, and source of chemical compounds employed in field tests in Puerto Rico*

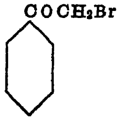
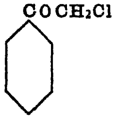
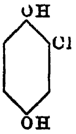
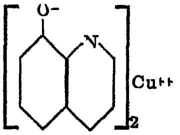
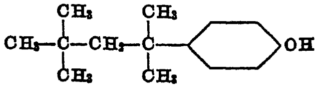
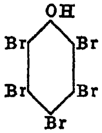
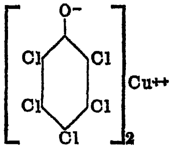
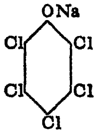
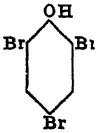
Survey No	*Compound and supplier*	
490	Acetophenone, bromo- (Phenacyl bromide) Eastman Kodak Co.	
547	Acetophenone, chloro- (Phenacyl chloride) Eastman Kodak Co.	
501	1,4-Hydroquinone, chloro- Eastman Kodak Co.	
679	8-Quinolinol, copper salt Monsanto Chemical Co.	
585	Phenol, octyl- (Diisobutyl phenol) Rohm & Haas.	
246	Phenol, pentabromo- Dow Chemical Co.	
674	Phenol, pentachloro-, copper salt Monsanto Chemical Co.	
270	Phenol, pentachloro-, sodium salt Dow Chemical Co. ("Dowicide G") and Monsanto Chemical Co. ("Santobrite briquettes").	
555	Phenol, 2,4,6-tribromo- Eastman Kodak Co.	

Table 1. *Name, structural formula, and source of chemical compounds employed in field tests in Puerto Rico*—Continued

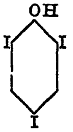
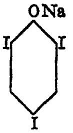
Survey No.	*Compound and supplier*	
566	Phenol, 2,4,6-triiodo- Eastman Kodak Co.	
626	Phenol, 2,4,6-triiodo-, sodium salt Eimer & Amend.	

Table 2. *Results of laboratory screening tests of chemical compounds employed in field tests in Puerto Rico*

Compound	Mortality of *Australorbis glabratus* (percent)					
	10 ppm	5 ppm	4 ppm	3 ppm	2 ppm	1 ppm
Acetophenone, bromo-	100	100	100	100	100	70
Acetophenone, chloro-	100	100	100	100	50	0
Hydroquinone, chloro-	100	100	90	80	60	------
8-Quinolinol, copper salt	100	------	------	------	------	------
Phenol, octyl-	100	60	------	------	------	------
Phenol, pentabromo-	100	100	100	50	30	0
Phenol, pentachloro-, copper salt	100	100	100	100	100	90
Phenol, pentachloro-, sodium salt	100	100	100	100	80	10
Phenol, 2,4,6-tribromo-	100	100	100	100	50	0
Phenol, 2,4,6-triiodo-	100	100	100	100	100	10
Phenol, 2,4,6-triiodo-, sodium salt	100	100	90	40	10	0

it was necessary to select areas for testing which were relatively isolated. In order to make a comparative study of the 11 compounds it was also necessary to find a large-sized area heavily populated with *Australorbis glabratus* so that some of the chemicals could be tested in closely situated plots with adequate controls. Only one such area was found. This was a large temporary swamp, heavily populated with the snails, located just east of Vega Baja on Highway 2R. It was in a low area surrounded on three sides by sugar cane fields and devoid of habitation or domestic animals. The water had accumulated to a depth of 1 foot or more in certain sections through the excessive and continued precipitation during the winter months. Permission to treat this swamp was granted by the Insular Land Office which generously cooperated even further by fencing the area with barbed wire as an extra precaution to prevent stray cattle from entering. Additional tests with the compounds were done in other parts of the island, e. g., in backwash waters along the Rio de la Arecibo just east of Arecibo; in lily ponds between Barceloneta and Arecibo; in roadside ditches between Vega Baja and Durado and in a few other areas which will be described in connection with the discussion of certain chemicals.

Readings of pH and temperature were taken separately for each test. In the case of the swamp near Vega Baja, large sections between the treated plots were used as controls. In all the initial experiments in this swamp the water was treated with the chemical in solution or in a fine suspension in acetone or alcohol in dosages calculated to produce a concentration of 10 parts per million. "Sure-shot" spray guns powered by compressed air were used for the application.

Estimates of the effectiveness of the compounds were made by ascertaining the proportion of viable snails present in the area before and after the application of the chemical. In the large swamp, observations were made prior to and 24, 48, 60, and 72 hours after the spraying. Unfortunately the water in the large swamp evaporated within 2 weeks after the tests were made, preventing further observation for a comparison of residual effects. However, in other areas, described in discussions of particular molluscacides, the observation periods were of longer duration. In some of the very small areas it was possible to obtain an approximate count of the entire population of snails found in the water and on the banks and vegetation. Most of the chemicals were so rapidly lethal that the snails had no opportunity to bore into the mud. In the larger areas it was likewise possible to examine large numbers of snails for viability although of course the total population could not be counted. The effects of treatment of the water were generally so dramatic that no equivocation in the expression of the results is necessary.

Results

Representative data on the comparative value of the chemical compounds tested in the Vega Baja swamp and in other areas are presented in table 3. In repeat tests with some of the compounds,

Table 3. *Comparative data of 11 chemical compounds used as molluscacides in still water*

Compound	Solvent	Size (square feet)	Area treated		Temperature of water (C°)	Effect on *Australorbis glabratus* Mortality (percent)
			Mean depth (feet)	pH of water		
Acetophenone, bromo (Phenacyl bromide).	Acetone	625	0.74	6.9	26	59
Acetophenone, chloro (Phenacyl chloride).	Acetone	500	.84	6.7	25	20
Hydroquinone, chloro-	Acetone	474	.47	7.3	25	No effect
8-Quinolinol, copper salt	Alcohol	80	.55	8.0	32	25
Phenol, octyl-	Acetone	83	.38	7.1	32	10
Phenol, pentabromo-	Acetone	54	.35	7.2	25	95–100
Phenol, pentachloro-, copper	Alcohol Tween 80	500	.93	6.9	28	95–100
Phenol, pentachloro-, sodium salt	Acetone	110	.24	7.6	29	95–100
Phenol, 2, 4, 6-tribromo-	Acetone	48	.32	8.0	32	95–100
Phenol, 2, 4, 6-triiodo-	Acetone Tween 80	462	.41	7.6	30	95–100
Phenol, 2, 4, 6-triiodo-, sodium salt	Water	60	.38	7.4	28	95–100

results similar to those given in the table were obtained. These are not tabulated but will be discussed separately where appropriate.

It will be noted that 6 of the 11 compounds were highly effective against *A. glabratus*, producing a mortality of 90 percent or more. Certain compounds which killed *A. glabratus* in the laboratory when used in concentrations of 10 ppm or less (see table 2) were found to be noneffective or only partially effective in killing the total population of this species in the field. Chlorohydroquinone, octylphenol, 8-quinolinol copper salt, phenacyl bromide, and phenacyl chloride belong in this category. Phenacyl bromide showed a moderate effectiveness, with 59 percent kill of the snails, but this chemical as well as phenacyl chloride is a tear gas and very disagreeable to use, making it impracticable as a molluscacide.

The six effective chemicals, pentabromophenol, copper pentachlorophenate, sodium pentachlorophenate, 2,4,6-tribromophenol, 2,4,6-triiodophenol and its sodium salt, were successful in killing 90 to 100 percent of the snails when used in concentrations of 10 parts per million. Some of these have advantages over others and the various plots and conditions under which they were tested are discussed later. All of the tests, except where indicated otherwise, were conducted with concentrations of 10 ppm.

2,4,6-Triiodophenol was tested in two plots, one at the Vega Baja swamp and the other at a small pond at Arecibo. The phenol was dissolved in acetone and Tween 80 before dispersion. In both instances the compound was found to be an excellent molluscacide, producing 95 to 100 percent kill of the snails. The snails were found contracted but not dead at 24 hours, and dead at 72 hours. The compound was tested only in standing water, and since it apparently acts somewhat slowly, it might be less effective in flowing waters. It was the only effective molluscacide which seemed to have little if any effect on fish; no dead fish were found in either of the experimental plots following treatment. The sodium salt of triiodophenol was similar in its molluscacidal effects to the phenol. However, it was toxic to fish, possibly because of its greater solubility. The cost of these iodine compounds remains relatively high, which precludes their use in the near future as practical molluscacides.

2,4,6-Tribromophenol was tested in five different plots containing standing water. One test was run with the compound in a concentration of 20 ppm, the others at 10 ppm. Two of these areas were situated at Vega Baja in the area of stagnant drainage water described previously. The Hoffman Memorial pool at the University of Puerto Rico served for one test, and a pond on the road between Arecibo and Barceloneta for another. Two tests were performed in drainage ditches containing stagnant water on the road between Durado and Vega Baja.

The tribromophenol is readily soluble in acetone and was easily dispersed in that solvent by the spray gun. In all but one of the tests, application of this compound resulted in 95 to 100 percent kill. In two of the tests, not only was there a total kill of all the snails present, but the embryos within the egg membranes were dead within 48 hours. In one of the roadside ditches between Durado and Vega Baja, no live snails were found for 6 weeks after application of the chemical. The one exception, in which no kill was obtained, was the other roadside plot in this area. It is not possible for us to explain this aberration on the basis of any data collected; the area tested was merely another segment of the same ditch in which the disappearance of snails for 6 weeks was noted. Incidentally, it should be mentioned that it is believed the absence of snails from the latter area was due to a residual effect of the tribromophenol, since snails were abundant only 3 feet away from the treated plot, and there were no barriers to their movement into it. The compound was slightly more toxic to fish than the iodophenol. It had no visible effect on native vegetation although it did damage imported water lilies in the Hoffman pool. This latter area remained free of snails for at least 41 days after treatment, even though fresh water was allowed to run into the pool 3 days after treatment and continued to run during the period of observation. It may be presumed, therefore, that all snail eggs were killed by the chemical

As the present market price of bromophenols is high, the use of this chemical as a molluscacide is not yet practical. However, it is possible that given a great enough demand, price reductions would ensue. It will first be necessary to demonstrate the efficacy of the compound in running water. All the tests reported here were done in standing waters.

Pentabromophenol was tested in three areas. One was a body of stagnant water at Arecibo, another a cement pool filled from a roadside drainage ditch between Durado and Vega Baja, the third a small pond off the road from Arecibo to Barceloneta. The kill was consistently 95 to 100 percent. Many snails migrated out of the water in the Arecibo test soon after the spraying and died within 48 hours. Pentabromophenol is lethal to fish but seemed to have little if any effect on aquatic vegetation. It is slowly soluble in acetone and alcohol, the two solvents available for these tests; hence more difficulty was experienced in dispersing it and a coarse jet was necessary on the sprayer. In addition to this disadvantage, this chemical has the same present obstacle of high cost as the preceding ones.

Copper pentachlorophenate was given three tests, one in the swampy area at Vega Baja and two in small lily ponds off the Arecibo-Barceloneta Road. This compound is very slightly soluble in 95 percent ethyl alcohol. It was used either as a fine suspension in alcohol or mixed with talc and a wetting agent, Alconox, and was found to be a very effective molluscacide, with kills of 90 to 100 percent within 24 hours of application. It has an advantage over other compounds in that it destroyed thick mats of algae and thus facilitated its own penetration into protected pockets of the ponds. It is, incidentally, also very toxic to fish.

Copper pentachlorophenate is low in cost and offers promise for development as an excellent molluscacide. Its greatest disadvantage is its insolubility in water. This difficulty may be overcome by mixing it with a water-soluble gum or wax. It is possible, also, that its insolubility may be turned to advantage in producing a long-lasting residual effect.

Sodium pentachlorophenate had been found to be a very effective molluscacide in the preliminary tests in Texas. It is also a relatively cheap compound and has the further advantage of solubility in water. Because of these considerations it was considered to be of particular promise. Two tests were made with it in standing water or in slow-flowing seepage water and some additional trials were made in various streams.

The test made in standing water was conducted in a small pond at Vega Baja. At 24 hours after treatment some snails were found alive, but all were dead at 48 hours. The compound thus was effective but it did not act as rapidly as the bromophenols or the copper salt of pentachlorophenol. ·Certain disadvantages were evident in its use: the compound is irritating to the mucous membranes and skin of the person applying it, especially when it is in powder form. However, it is also manufactured in pellets or 1-ounce briquettes, which minimize such effects. It was found very toxic to fish and killed guppies, *Lebistes reticulatus*, even at a concentration of 1 part per million.

Toxicity tests on rodents (*12*) had indicated that sodium pentachlorophenate was not too dangerous to use However, before tests were made in flowing water some further assurance was necessary that the compound could be applied without injury to humans or cattle using the water below the site of application. Two toxicity tests were therefore conducted. In one, 200 cc. of water containing 20 ppm of sodium pentachlorophenate were administered by stomach tube to a 5-pound Rhesus monkey. The animal suffered no visible distress. In another experiment a calf was given water containing 20 ppm of the compound over a period of 4 days, during which time it consumed 40 gallons. No ill effects were observed. It was therefore concluded that little risk would be involved in applying sodium pentachlorophenate to water at concentrations of 10 ppm.

The first test was made in a seepage area at Patillas. Here the water was flowing very slowly, at about 9½ gallons per minute. Numerous pools choked with water hyacinths existed along the course. Four ounces of sodium pentachlorophenate killed all the *A. glabratus* in the critical area, 20 feet long by 5.7 feet in width and 0.7 feet average depth; more than 90 percent of the snails for a distance of 120 feet below the application site were destroyed.

In the second plot, a ditch at Vega Baja flowing at the rate of 21.6 gallons per minute, 6.9 ounces of sodium pentachlorophenate were placed in a muslin bag and suspended in the water. All of the snails were killed for a distance of 320 feet below the application site. This effect was obtained in 24 hours.

The third test was performed at Los Peña, just east of Rio Piedras. Here a small creek (Quebrada Sabana Llana) combined most of the features desired for a critical test of the molluscacides in flowing water. In its course through the region chosen for testing, which was 660 feet in length, the creek cascaded over rocks in several narrow channels and in other places meandered slowly through pools 5 feet or more in depth. The average width was 1.8 feet and the average depth 0.4 feet. Current flow was 630 gallons per minute. Large populations of snails, principally *A. glabratus*, were found in the dense vegetation along the margins. It was expected that such a thick growth would probably deflect the flow of water containing the molluscacide and thereby furnish a rigid test of the efficacy of the compound.

The chemical was applied at a calculated dosage of 9.5 ppm based on a 6-hour flow rate. Four of the largest pools in the critical area were dosed separately at the rate of 10 ppm and the rest of the compound was applied by immersing it in four muslin bags in the stream at the head of the observation area. Two of the bags were placed in the rapid current and the other two along the margins where the current was reduced. Within 2 hours all the chemical had gone into solution in the swift flowing water and about half the contents had dissolved in the bags at the margins.

Two hours after application of the chemical, it was observed that many of the snails had contracted into their shells and hemorrhaging was seen in some of these. Twenty hours after treatment hundreds of dead snails were floating on the surface, and a very thorough search failed to reveal any live specimens in the critical area. Observations were therefore extended down the stream, and it was impossible to find any live snails for a distance of 1½ miles from the application site. Within this distance three tributary streams entered the creek. The chemical was not effective beyond the entrance of the third and largest tributary, probably because of the marked dilution beyond this point. Two days following treatment numerous egg clutches of planorbid snails were observed floating downstream. A number of these were collected and found to contain only dead embryos. Catfish (probably *Ameiurus nebulosus*), guppies (*Lebistes reticulatus*), and eels (*Anguilla rostrata*) were dead within a few hours after application of the compound, although edible crayfish appeared unharmed. Algae in the stream turned yellow but other vegetation was not affected.

Discussion

The results of these tests indicate that certain halogenated phenols possess marked molluscacidal properties and are capable of destroying the snail population in infested waters when employed in relatively low concentrations. The pentachlorophenol salts give particular promise of practical employment in the control of schistosomiasis because of their relatively low cost.

The experiments in question were preliminary, and additional field trials are needed before final conclusions can be drawn as to the practicability of employing these compounds in the control of the disease. Additional work is needed to ascertain whether control of the snail intermediate host in an endemic area could be achieved with the treatment of all watersheds within the area. Long-term observations would have to be made in order to establish whether a complete kill is obtained and the time necessary for reintroduction of snails into the area. From the results obtained with sodium pentachlorophenate in the Los Peña stream, it would appear to the authors that a given watershed would not require re-treatment for a period of at least 6 months and perhaps not for 1 year. However, the question can only be settled by additional observations.

More data are needed on the minimum effective concentration of the chemicals for the destruction of the snail intermediate hosts. Opportunity was not afforded in the present work to establish these facts. A residual action exercised over a period of 6 weeks in two experiments gives some indication that the effect of the chemicals would probably persist for some time in stationary bodies of water. It seems improbable that any residual action could be expected in streams since the chemical would be carried off by the flow. Additional studies are needed on the effect of the most promising compounds on aquatic life. It is not known whether the chemicals would be destructive to the eggs of crayfish and various species of fish. In areas where fish are of economic importance, streams could be restocked after treatment, if, as seems likely, the aquatic environment is not disturbed to the point of being unfavorable for their maintenance. It seems likely that no permanent alterations occur in such environment. Twenty-four hours after the application of sodium pentachlorophenate to the stream at Los Peña, guppies had returned to the treated area. More information is needed on the toxicity of the compounds for mammals and further tests are being conducted at this time.

Summary

Eleven chemical compounds which proved effective in killing *Australorbis glabratus* in the laboratory in dilutions of 10 ppm or less were tested on this same species of snail in its natural environment in Puerto Rico. Six of these proved to be very effective molluscacides although the present price of four of them (2,4,6-triiodophenol, 2,4,6-triiodophenol sodium salt, 2,4,6-tribromophenol, and pentabromophenol) may prohibit their use on a large scale. Two compounds (sodium pentachlorophenate and copper pentachlorophenate) are excellent molluscacides and their cost is reasonable. In a stream near Los Peña, sodium pentachlorophenate at 9.5 ppm calculated on a 6-hour flow-rate dose destroyed all snails for a distance of 1½ miles downstream in spite of the entrance of three untreated tributary streams within this area. Embryos within the snail eggs were also killed. The compound was lethal to catfish, guppies, and eels, but apparently did not affect crayfish.

The toxicity of the effective compounds for mammals is under further study, and field trials are being extended to other areas.

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The Visual Identification of V and W Form Colonies in *Salmonella* Cultures

By Maurice Landy, Ph. D.*

Shortly after the discovery of Vi antigen in typhoid cultures by Felix and Pitt in 1934 (*1*), Kauffmann introduced the terminology of V and W forms to describe certain colonial forms in *Salmonella* cultures containing Vi antigen. According to his terminology, the V form colony consists of organisms which possess Vi antigen and are relatively O-inagglutinable while organisms constituting the W form colony contain no Vi antigen and are readily agglutinated by O antiserum. Frequently, both forms occur in the same culture. Indeed, with certain organisms such as *Salmonella coli* 5396/38 (*2*) and *S. ballerup* we have been unable to isolate either form in the pure state. Kauffmann (*3*), Craigie and Brandon (*4*), and Giovanardi (*5*) observed that in cultures containing both V and W forms, these colonies were readily distinguishable when viewed by refracted light. The V form colony appeared opaque, whereas the W form was relatively translucent. This visual means of differentiating the V and W forms is a most practical and convenient laboratory procedure. A glance will show whether certain *Salmonella* cultures are in the V or W state, or are a mixture of both forms.[1] The ease with which these colonial types may be differentiated by visual means is dependent largely on the optical arrangement for viewing with oblique illumination. Consequently, a very simple lighting arrangement employed in this laboratory, which has proved valuable for this purpose, is described.

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The visual examination of V and W forms, as performed in this laboratory, follows. The mirror is removed from its attachment to a dissecting microscope base and placed concave side uppermost on the laboratory bench equidistant from the microscope lamp (with blue glass filter removed) and the dissecting microscope. A convenient distance between lamp and microscope is from 4 to 6 inches. The microscope lamp is tilted down so that the light strikes the center of the mirror and is deflected up through the glass stage of the dissecting microscope. While viewing a streak plate on the microscope stage, the proper intensity and centering of the light can be achieved easily by manipulating the mirror until maximum contrast is obtained. The magnification obtained with a 2× objective and 10× ocular is suitable for colony differentiation. When the light source is arranged as described, V and W forms (*S. typhosa, S. paratyphi C* (East Africa), *S. coli* and *S. ballerup*) exhibit a characteristic appearance. The V forms appear very dense and with the refracted light exhibit a reddish-coppery color, while the W forms are translucent and appear grayish-green. When both colonial forms are found in the same field, as frequently is the case, the contrast in appearance is immediately apparent. It has been observed that while the appearance of the W forms of typhoid, coli, and ballerup cultures is similar, the V forms of these cultures present a somewhat varied picture. The degree of density of the colony and the coppery appearance, or color, appears to be associated with the quantity of Vi antigen present. Thus, colonies of *S. coli* and *S. ballerup* cultures, which are a richer source of Vi antigen than is *S. typhosa*, invariably are more dense in appearance and exhibit a deeper copper color.

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[1] While the colonial appearance of V form colonies generally is characteristic, it still is advisable to verify the presence of Vi antigen by emulsification of one or more colonies and by a slide agglutination test with a pure Vi antiserum.

Incidence of Disease

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

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UNITED STATES

Reports From States for Week Ended July 8, 1950

New cases of acute poliomyelitis reported in the Nation for the current week numbered 478, an increase over the 390 cases reported for the preceding week. However, the number was lower than the 683 cases reported for the corresponding week last year. The cumulative total (2,529) for the current "disease" year was below the corresponding total of 2,954 for the last year, the highest year on record. The "disease" year for acute poliomyelitis begins with the twelfth week of the calendar year.

For the current week, all geographic divisions except two showed increases over the preceding week in reported cases of acute poliomyelitis. These increases ranged from 1 in the New England States

Comparative Data for Cases of Specified Reportable Diseases: United States

[Numbers after diseases are International List numbers, 1948 revision]

Disease	Total for week ended—		5-year median 1945-49	Seasonal low week	Cumulative total since seasonal low week		5-year median 1944-45 through 1948-49	Cumulative total for calendar year		5-year median 1945-49
	July 8, 1950	July 9, 1949			1949-50	1948-49		1950	1949	
Anthrax (062)	1	------	(1)	(1)	(1)	(1)	(1)	25	33	(1)
Diphtheria (055)	61	80	132	27th	7,399	8,882	13,863	3,128	3,768	6,297
Acute infectious encephalitis (082)	15	10	8	(1)	(1)	(1)	(1)	381	279	239
Influenza (480-483)	590	527	527	30th	275,231	110,982	180,460	244,701	74,712	136,902
Measles (085)	5,961	5,742	5,742	35th	290,499	627,006	561,860	271,369	574,613	526,914
Meningococcal meningitis (057.0)	66	54	54	37th	3,258	2,890	3,130	2,345	2,046	2,158
Pneumonia (490-493)	913	848	------	(1)	(1)	(1)	--------	56,222	50,951	------
Acute poliomyelitis (080)	478	683	311	11th	[2] 2,529	2,954	1,696	[2] 3,663	3,869	2,163
Rocky Mountain spotted fever (104)	24	20	20	(1)	(1)	(1)	(1)	193	258	193
Scarlet fever (050)	413	366	614	32d	55,169	78,970	86,258	38,730	56,420	59,572
Smallpox (084)	------	------	1	35th	43	50	195	23	40	141
Tularemia (059)	19	19	19	(1)	(1)	(1)	(1)	530	659	539
Typhoid and paratyphoid fever (040, 041)[3]	86	118	101	11th	998	981	1,087	1,508	1,469	1,560
Whooping cough (056)	2,504	1,295	1,648	39th	[4] 93,245	38,799	82,489	[4] 71,709	28,766	51,223

[1] Not computed.
[2] Deductions: Michigan, week ended Apr. 14, 1 case; Georgia, week ended July 1, 1 case.
[3] Including cases reported as salmonellosis.
[4] Addition: Indiana, week ended June 17, 20 cases.

to 37 in the South Atlantic States. Decreases from the same period were shown in the West South Central States (from 168 to 150) and the Mountain States (from 8 to 7). Texas reported the largest number of cases (105) but at the same time showed a decrease from the preceding week (124).

The total number of cases of influenza reported for the current week was 590, compared with 527 for the corresponding period last year. The cumulative total for the "disease" year was 275,231 cases of influenza. The 5-year (1945–49) median was 180,460.

Reported cases of meningococcal meningitis for the week numbered 66, compared with 72 for the preceding week, 54 for the corresponding week last year, and 54 for the 5-year median. The cumulative total for the current calendar year was 2,345, compared with the 5-year median of 2,158 cases.

The number of cases of acute infectious encephalitis reported for the week was 15, a decrease from the preceding week (22). For the corresponding week last year 10 cases were reported. The 5-year median for the week was 8 cases. The cumulative total of reported cases during the present calendar year was 381, which may be compared with the corresponding figure of 279 for 1949 and 239 for the 5-year median.

The total number of cases of whooping cough reported for the week in the Nation numbered 2,504, compared with 2,289 the preceding week, 1,295 for the corresponding week last year, and 1,648 for the 5-year median. The cumulative total for the current calendar year was 71,709, compared with 51,223 for the 5-year median.

No smallpox was reported in the United States. One case of anthrax was reported in Georgia, and one fatal case of bubonic plague was reported in San Miguel County, N. Mex.

Deaths During Week Ended July 8, 1950

	Week ended July 8, 1950	*Corresponding week, 1949*
Data for 92 large cities of the United States:		
Total deaths	8, 401	9, 267
Median for 3 prior years	8, 892	----------
Total deaths, first 27 weeks of year	255, 423	254, 141
Deaths under 1 year of age	614	692
Median for 3 prior years	692	----------
Deaths under 1 year of age, first 27 weeks of year	16, 653	17, 420
Data from industrial insurance companies:		
Policies in force	69, 703, 883	70, 327, 350
Number of death claims	8, 461	9, 750
Death claims per 1,000 policies in force, annual rate	6. 3	7. 2
Death claims per 1,000 policies, first 27 weeks of year, annual rate	9. 7	9. 4

Reported Cases of Selected Communicable Diseases: United States, Week Ended July 8, 1950

[Numbers under diseases are International List numbers, 1948 revision]

Area	Diphtheria (055)	Encephalitis, infectious (082)	Influenza (480–483)	Measles (085)	Meningitis, meningococcal (057.0)	Pneumonia (490–493)	Poliomyelitis (080)
United States	61	15	590	5,961	66	913	478
New England	4			611	2	24	8
Maine	1			21		8	2
New Hampshire				1			
Vermont				33			1
Massachusetts	3			379	1		3
Rhode Island						1	1
Connecticut				177	1	15	1
Middle Atlantic	4	6	1	2,021	10	262	51
New York	4	5	(1)	732	5	166	29
New Jersey		1	1	976	2	53	16
Pennsylvania				313	3	43	6
East North Central	8	1	4	1,783	13	110	40
Ohio	3			346	5	19	7
Indiana	3			77		8	
Illinois	2	1	3	408	3	55	19
Michigan				388	3	21	8
Wisconsin			1	564	2	7	6
West North Central	3		6	223	7	118	44
Minnesota	1		2	32	2	4	7
Iowa	1			36			12
Missouri			1	67	4	16	1
North Dakota				9		90	1
South Dakota	1			21			1
Nebraska			3	34		3	13
Kansas				24	1	5	9
South Atlantic	8	1	144	227	6	54	84
Delaware				14			
Maryland			2	47		9	
District of Columbia				14	1	5	5
Virginia			136	61	1	18	22
West Virginia			2	33	1	3	5
North Carolina	4			17			4
South Carolina	1	1	1	8		1	31
Georgia	3		3	8	2	8	9
Florida				25	1	10	8
East South Central	9		10	121	5	50	50
Kentucky	1			46	1	1	9
Tennessee	4		6	44	4		13
Alabama	4		4	24		40	20
Mississippi				7		9	8
West South Central	25	3	362	261	13	214	150
Arkansas			14	51	1	8	13
Louisiana	3			11	2	30	6
Oklahoma	4	1	15	20	2	11	26
Texas	18	2	333	179	8	165	105
Mountain			59	294	1	39	7
Montana			26				1
Idaho				26	1		1
Wyoming				9			
Colorado			5	121		20	
New Mexico				6		3	3
Arizona			27	8		11	
Utah			1	124		5	2
Nevada							
Pacific		4	4	420	9	42	44
Washington				31	3	3	4
Oregon				6		15	6
California		4	4	383	6	24	34
Alaska						1	
Hawaii			1	5			

[1] New York City only.

Anthrax: Georgia, 1 case.

Reported Cases of Selected Communicable Diseases: United States, Week Ended July 8, 1950—Continued

[Numbers under diseases are International List numbers, 1948 revision]

Area	Rocky Mountain spotted fever (104)	Scarlet fever (050)	Small-pox (084)	Tularemia (059)	Typhoid and paratyphoid fever (040, 041)[1]	Whooping cough (056)	Rabies in animals
United States	**24**	**413**		**19**	**86**	**2,504**	**102**
New England		**36**				**184**	
Maine		3				20	
New Hampshire							
Vermont		1				16	
Massachusetts		27				93	
Rhode Island						3	
Connecticut		5				52	
Middle Atlantic	**5**	**84**			**12**	**297**	**14**
New York	3	[2] 42			6	108	14
New Jersey	1	13			2	99	
Pennsylvania	1	29			4	90	
East North Central		**159**			**8**	**586**	**27**
Ohio		108			4	213	11
Indiana		7				45	12
Illinois		12			1	62	3
Michigan		19			1	146	1
Wisconsin		13			2	120	
West North Central		**19**			**4**	**122**	**8**
Minnesota		4			1	18	
Iowa		1				31	8
Missouri		3			2	18	
North Dakota		2				8	
South Dakota							
Nebraska		4				2	
Kansas		5			1	45	
South Atlantic	**11**	**31**		**3**	**16**	**423**	**22**
Delaware						5	
Maryland	1	3			1	70	
District of Columbia						2	
Virginia	4	10			2	137	2
West Virginia		2			2	87	6
North Carolina	5	5			3	77	
South Carolina	1	3		1		23	7
Georgia		4		2	7	15	6
Florida		4			1	7	1
East South Central	**1**	**26**		**2**	**18**	**63**	**11**
Kentucky		4			15	18	6
Tennessee	1	13			1	9	
Alabama		4			2	29	5
Mississippi		5		2		7	
West South Central	**1**	**7**		**14**	**18**	**489**	**17**
Arkansas	1			14	2	33	1
Louisiana		2				4	
Oklahoma		1			3	47	1
Texas		4			13	405	15
Mountain	**4**	**9**			**3**	**131**	**1**
Montana					2	18	
Idaho						17	
Wyoming	1					4	
Colorado	3	2				30	1
New Mexico					1	6	
Arizona		5				37	
Utah		1				19	
Nevada		1					
Pacific	**2**	**42**			**7**	**209**	**2**
Washington		2				54	
Oregon	1	3			1	83	
California	1	37			6	72	2
Alaska							
Hawaii						2	

---

[1] Including cases reported as salmonellosis.
[2] Including cases reported as streptococcal sore throat.

FOREIGN REPORTS

CANADA

Reported Cases of Certain Diseases—Week Ended June 24, 1950

Disease	New-foundland	Prince Edward Island	Nova Scotia	New Bruns-wick	Que-bec	On-tario	Mani-toba	Sas-katch-ewan	Al-berta	Brit-ish Co-lum-bia	Total
Brucellosis							2				2
Chickenpox			8	4	89	228	36	8	50	149	572
Diphtheria					1						1
Dysentery, bacillary					1	2					3
Encephalitis, infectious						2					2
German measles			4	21	10	835	11	90	114	423	1, 508
Influenza						6	7				13
Measles					256	723	20	20	26	224	1, 269
Meningitis, meningococcal			1	1		4	1		4		11
Mumps			25	53	80	311	8	37	68	121	703
Poliomyelitis						2				2	4
Scarlet fever	3		1	2	47	15	3	8	29	10	118
Tuberculosis (all forms)	9		4	5	134	19	9	18	5	24	227
Typhoid and paratyphoid fever					13	3					16
Venereal diseases:											
Gonorrhea	17		9	11	84	51	20	15	47	56	310
Syphilis	2		1	5	47	18	13	3	3	11	103
Whooping cough	1		6	1	80	60	3	2	1	47	201

JAMAICA

Reported Cases of Certain Diseases—4 Weeks Ended June 24, 1950

Disease	Kingston	Other localities	Total	Disease	Kingston	Other localities	Total
Chickenpox	21	73	94	Paratyphoid fever		1	1
Diphtheria	1	2	3	Poliomyelitis		1	1
Dysentery, unspecified	2	3	5	Puerperal sepsis		2	2
Erysipelas	2	1	3	Tuberculosis, pulmonary	23	42	65
Leprosy	1	2	3	Typhoid fever	10	49	59
Meningitis, meningococcal	1	1	2	Typhus fever (murine)	5		5

NEW ZEALAND

Reported Cases of Certain Diseases and Deaths—4 Weeks Ended May 27, 1950

Disease	Cases	Deaths	Disease	Cases	Deaths
Brucellosis	5		Malaria	1	
Diphtheria	7		Meningitis, meningococcal	15	
Dysentery:			Poliomyelitis	6	1
Amebic	7		Puerperal fever	3	
Bacillary	23		Scarlet fever	81	
Encephalitis, infectious	3		Tetanus	8	4
Erysipelas	11		Tuberculosis (all forms)	138	34
Food poisoning	21	1	Typhoid fever	5	1

JAPAN

Reported Cases and Cumulative Totals of Certain Diseases and Deaths

5 weeks ended Apr. 29, 1950

Disease	5 weeks ended Apr. 29, 1950		Total reported for the year to date	
	Cases	Deaths	Cases	Deaths
Diarrhea, infectious	11		21	
Diphtheria	1, 215	110	4, 797	507
Dysentery, unspecified	828	130	1, 851	382
Filariasis	6		32	
Gonorrhea	17, 032		53, 792	
Influenza	812		16, 032	
Leprosy	75		190	
Malaria	54	2	192	18
Measles	8, 353		21, 559	
Meningitis, meningococcal	134	36	407	97
Paratyphoid fever	73	5	270	13
Poliomyelitis	130		494	
Pneumonia	20. 291		79, 612	
Puerperal infection	87		302	
Rabies	9		25	
Scarlet fever	474	4	1, 440	9
Schistosomiasis	43		115	
Smallpox	1		4	
Syphilis	13, 284		43, 419	
Tetanus	170		494	
Tuberculosis	46, 880		135, 448	
Trachoma	13, 018		39, 386	
Typhoid fever	311	44	1, 013	154
Typhus fever	95	6	766	49
Whooping cough	12, 324		43, 520	

4 weeks ended May 27, 1950

Disease	4 weeks ended May 27, 1950		Total reported for the year to date	
	Cases	Deaths	Cases	Deaths
Diarrhea, infectious	3		25	
Diphtheria	807	50	5, 596	556
Dysentery, unspecified	1, 826	290	3, 674	672
Encephalitis, Japanese "B"	1		1	
Filariasis	6		38	
Gonorrhea	13, 520		67, 493	
Influenza	505		16, 768	
Leprosy	54		244	
Malaria	69	2	261	20
Measles	8, 771		30, 320	
Meningitis, meningococcal	67	28	473	125
Paratyphoid fever	160	12	433	25
Poliomyelitis	150		644	
Pneumonia	11, 386		91, 001	
Puerperal infection	59		361	
Rabies	2		23	
Scarlet fever	633	3	2, 076	12
Schistosomiasis	54		169	
Smallpox			3	
Syphilis	9, 890		53, 306	
Tetanus	154		650	
Tuberculosis	37, 617		173, 066	
Trachoma	20, 074		59, 456	
Typhoid fever	451	46	1, 462	199
Typhus fever	64	2	829	51
Whooping cough	10, 529		54, 049	

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

The following tables are not complete or final for the list of countries included or the figures given. Since many of the figures are from weekly reports, the accumulated totals are for approximate dates.

CHOLERA

(Cases)

Place	January-April 1950	May 1950	June 1950—week ended—			
			3	10	17	24
ASIA						
Burma	8	7		2	1	
Akyab		1		1		
Bassein	1			1	1	
Maubin	3					
Rangoon	1					
India	45,035	13,177	317	320	297	272
Ahmedabad		7				
Allahabad		3				
Bombay		[1] 1		1		
Calcutta	[2] 4,797	1,712	316	318	283	260
Cawnpore		1				
Cocanada	2					
Cuddalore	31					
Lucknow		3	1	1	4	
Madras	11					
Masulipatam	46					
Negapatam	67					
New Delhi						12
Port Blair (Andaman Island)	[1] 2					
Tellicherry	27					
Tuticorin	25					
Indochina (French)	6	6			1	
Cambodia	5					
Cochinchina	1	6			1	
Giadinh		3				
Rachgia	1					
Pakistan	15,176	3,944	[3] 370	[3] 47	[3] 47	
Chittagong	53	72	14	10	9	
Dacca	153	29	4			

---

[1] Imported.

[2] Includes imported cases.

[3] Preliminary figures.

PLAGUE

(Cases)

AFRICA						
Belgian Congo	4	3	1		1	1
Costermansville Province	2	2				
Stanleyville Province	2	1	1		1	1
Madagascar	41	3			[1] 1	
Rhodesia, Northern	2					
Union of South Africa	8	1				
Orange Free State	6	1				
ASIA						
Burma	[2] 204	4	2	1		
Bassein	1					
Bhamo	[3] 2		1			
Henzada	12					
Kyaiklat	34					
Moulmein		[3] 1	1			
Myaungmya	5					
Myingyan	2					
Pegu	1					
Pyapon	1					
Rangoon	[2] 2	[2] 3		1		
Yenangyaung	58					
China:						
Chekiang Province	10					
Wenchow	[4] 4					
Fukien Province	[5] 121					
Kwangsi Province	[4] 63					
Kwangtung Province	15					

See footnotes at end of table.

PLAGUE—Continued

Place	January–April 1950	May 1950	June 1950—week ended—			
			3	10	17	24
ASIA—continued						
India	35,920	6,582				
Allahabad	[3] 14	[3] 4	[3] 1			
Bombay	2	[2] 3				
Calcutta	[3] 1	2				
Cawnpore	18					
Lucknow	[2] 8	[3] 1				
Indochina (French):						
Annam	42	16	2	2	3	5
Phanthiet	38	16	2	2	3	5
Cambodia	9	[7] 36		1		
Pnompenh	3					
Cochinchina	2	5				
Laos	2					
Indonesia:						
Java	293	26				
Bandoeng	2					
Jogjakarta	[8] 132	26	7	4	3	
Pakistan	[3] 1					
Karachi	[3] 1					
Thailand (Siam)	52	4				
SOUTH AMERICA						
Ecuador	10	2				
Chimborazo Province		2				
El Oro Province	4					
Loja Province	6					
Peru	6	3				
Lambayeque Department		1				
Lima Department	1					
Piura Department	5	2				
Venezuela	5					
Miranda State	5					

---

[1] June 11–20, 1950. [2] Includes imported cases. [3] Imported. [4] Deaths.
[5] Corrected figure. Includes 9 deaths reported as cases on Kinmen Island.
[6] Preliminary figures. [7] Includes suspected cases. [8] Corrected figure.

SMALLPOX

(Cases)

AFRICA						
Algeria	43	30		[1] 2		
Angola	80					
Bechuanaland	7					
Belgian Congo	967	293	87	44		
British East Africa:						
Kenya	10					
Nyasaland	226	11		[2] 2	1	
Tanganyika	366	126	2		2	8
Uganda	1	1				
Cameroon (British)	233	5				
Cameroon (French)	34	54		[2] 3		
Dahomey	182	15		[2] 2		
Egypt	[3] 4					
Eritrea	1					
Ethiopia	7					
French Equatorial Africa	403	14				
French Guinea	5	6		[2] 1		
French West Africa: Haute Volta	127	45		[2] 16		
Gambia	4	1				
Gold Coast	33	61	4			
Ivory Coast	444	49			[4] 3	
Libya	2					
Mauritania	1					
Morocco (French)	5					
Mozambique	89	18				
Nigeria	10,150	1,280	[5] 8	[5] 10	[5] 10	
Niger Territory	635	260		[2] 29		
Rhodesia:						
Northern	4					
Southern	275	55				
Senegal	2					
Sierra Leone	25					

See footnotes at end of table.

SMALLPOX—Continued

Place	January-April 1950	May 1950	June 1950—week ended— 3	10	17	24
AFRICA—continued						
Sudan (Anglo-Egyptian)	48	4	1		19	
Sudan (French)	93	3				
Togo (French)	42				[4] 6	
Tunisia	1					
Union of South Africa	283	[6] 4			[6] 1	
ASIA						
Afghanistan	215	40				
Arabia	320					
Bahrein Islands: Bahrein	34					
Burma	4,798	110	15	12	8	
China	624					
India	69,365	18,329	[7] 234	[7] 197	[7] 186	[7] 127
India (Portuguese)	19	1				
Indochina (French)	264	8	2	5	1	1
Indonesia:						
Borneo	112	32	1	6	51	
Java	948	717	184	194	210	
Sumatra	188	44	17	8	1	
Iran	148	19	4	2		
Iraq	100	14	1	10	1	3
Israel	15					
Japan	4					
Korea (Republic of)	1,271	[7] 47				
Lebanon	[8] 1	1				
Netherlands New Guinea	3					
Pakistan	8,353	2,775	474	244	113	
Palestine	87					
Syria	15					
Thailand (Siam)	457	3				
Transjordan	27	2			1	
Turkey (See Turkey in Europe.)						
EUROPE						
Great Britain:						
England: Liverpool	[8] 1					
Scotland: Glasgow	21					
Greece		1		2		12
Athens				1		
Piraeus						1
Xylokastron		1				
Turkey	8					
NORTH AMERICA						
Guatemala	2					
Mexico	111	22	4		13	
SOUTH AMERICA						
Argentina	353	45				
Brazil	27		1	1		
Chile	2,847	635		41		45
Colombia	499	12				
Ecuador	76	7				
Paraguay		1				
Peru	510					
Venezuela	42					
OCEANIA						
Australia: Fremantle	[8] 1					

[1] In Algiers. [2] June 1–10, 1950. [3] Includes imported cases. [4] June 11–20, 1950. [5] In Lagos only. [6] In Johannesburg only. [7] In ports only. [8] Imported.

TYPHUS FEVER*

(Cases)

AFRICA						
Algeria	63	20		[1] 1		
Basutoland	20	2				
Belgian Congo	[3] 39	4				
British East Africa: Kenya	[2] 7					
Egypt	40	24	1	4	5	2
Eritrea	8	2		1	2	1

See footnotes at end of table.

TYPHUS FEVER—Continued

Place	January-April 1950	May 1950	June 1950—week ended—			
			3	10	17	24
AFRICA—continued						
Ethiopia	213					
French Equatorial Africa	4					
Gold Coast	6					
Libya	67	16	1	2	3	1
Madagascar	[3] 1			[1] 1		
Morocco (French)	3	1				
Morocco (International Zone)	1					
Morocco (Spanish Zone)	3					
Nigeria	1					
Rhodesia, Southern	[4] 5					
Sierra Leone	[3] 1					
Sudan (Anglo-Egyptian)	4					
Tunisia	38	11				
Union of South Africa	[2] 30	[3] 1				
ASIA						
Afghanistan	929	248				
Burma	[3] 8					
China	[2] 8					
India	182	55				
India (Portuguese)	8					
Indochina (French)	12	18				
Indonesia:						
Java	6					
Sumatra	1					
Iran	115	18	6			
Iraq	79	11	7		7	7
Japan	766	27	1	2	3	2
Korea (Republic of)	[3] 1,103	[3, 5] 58				
Lebanon	1					
Pakistan	54	14	2			
Palestine: Jerusalem		1				
Straits Settlements: Singapore	[2] 3	[3] 1				
Syria	[2] 31	4			2	
Transjordan	12	1				1
Turkey (see Turkey in Europe).						
EUROPE						
France	1					
Germany (British Zone)	1					
Germany (French Zone)	2					
Germany (United States Zone)	1					
Great Britain:						
England: Liverpool				[3, 6] 1		
Island of Malta	[3] 2	[3] 1				
Greece	[2] 20					
Hungary	3					
Italy	24	57				
Sicily	16	57				
Poland	37					
Spain	12	1	1			
Turkey	110	22	10		8	
Yugoslavia	138	71				
NORTH AMERICA						
Costa Rica [3]	3					
Guatemala	9					
Jamaica [3]	7	4	5			
Mexico [2]	38	6	1	2	3	1
Panama Canal Zone	[3] 1					
Puerto Rico [3]	9					
SOUTH AMERICA						
Argentina	[2] 2					
Chile	52	11	1	3	2	
Colombia	[3] 332	[2] 22				
Curacao	1					
Ecuador	[2] 77	[2] 8				
Peru	[7] 251					
Venezuela	[3] 5	[3] 1				
OCEANIA						
Australia [3]	57	7	7			
Hawaii Territory	[3] 2	[8] 1				

*Reports from some areas are probably murine type, while others include both murine and louse-borne types.

[1] June 1-10, 1950.
[2] Includes murine type.
[3] Murine type.
[4] April 1-30, 1950.
[5] In Inchon and Seoul.
[6] Imported.
[7] Jan. 1-Feb. 28, 1950.
[8] Off-shipping.

YELLOW FEVER

(C=cases; D=deaths)

Place		January-April 1950	May 1950	June 1950-week ended—			
				3	10	17	24
AFRICA							
French Equatorial Africa	C	1					
Port Gentil	C	[1] 1					
Gold Coast	C	10					
Ankobra Ferry	D	1					
Kade	C	1					
Oda Area.							
Akwatia	C	[2] 7					
Atiankama	C	1					
Sierra Leone	C	1			[1] 1		
Koinadugu District	C	1			1		
NORTH AMERICA							
Panama:							
Colon	D	1					
SOUTH AMERICA							
Bolivia:							
Chuquisaca Department	C	[3] 850					
La Paz Department	C	--	[4] 17				
Colombia:							
Mocoa Locality	D	2					
Peru:							
Cuzco Department	D	[5] 2					
Quincemil	D	2					
Huanuco Department	C	[6] 1					
Tingo Maria	C	1					
Junin Department	D				1		
San Ramon	D				1		
San Martin Department	D	1	1				
Juanjui	D	[5] 1					
Lamas	D		1				

[1] Suspected. [2] Includes 4 suspected cases. [3] Reported in Azero Province during the period Jan. 1-Mar. 14, 1950, with 230 deaths [4] Outbreak in North and South Yungas Provinces. Eight deaths reported. [5] February 1950. [6] April 1950.

Bubonic Plague in San Miguel County, N. Mex.

Under date of July 11, 1950, positive cultures of bubonic plague were reported in Pecos, San Miguel County, N. Mex., by the State Health Department. An autopsy was performed July 4, the day that the patient died, but no gross signs of plague were observed. Cultures were sent to the Western Communicable Disease Center Laboratory, San Francisco, for further study.

✦ ✦ ✦

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TUBERCULOSIS CONTROL ISSUE NO. 54

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PUBLIC HEALTH SERVICE

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Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
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Division of Public Health Methods
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—Editorial—

Licensure of BCG Vaccine

On July 12, the Public Health Service licensed the Research Foundation and the University of Illinois for "manufacture, exportation, importation and sale" of BCG. Until now, licensure of the product has awaited manufacture in accordance with certain requirements. In view of the divergence of opinion about this biological product, it seems in order to consider the significance of such action. It means that the vaccine produced by the licensed laboratory has been found safe by trial with animals, that it is free from contaminating substances, and that it will produce a satisfactory immediate reaction in animals and human beings when used within the prescribed time limit. Thus, the vaccine may enter interstate commerce and will be available to health officers and clinicians who wish to use it as a protective measure against tuberculosis.

In those places of the world where tuberculosis is a national emergency and where prosecution of the usual control methods is impossible, it is understandable that BCG has been given extensive application. In this country, where we are not faced with the same deficiencies, the medical profession for the most part has not advocated the widespread usage of the vaccine. The Council on the Management and Treatment of Diseases of the Chest, reporting for the American College of Chest Physicians, has recommended that the use of BCG vaccine be restricted to controlled studies (*1*). The American Trudeau Society (*2*) recommends that the use of BCG be limited to groups especially exposed to the risk of tuberculous infection.

The Public Health Service, like others concerned about tuberculosis, would welcome any agent which would prevent the personal tragedy and public health problem of tuberculosis. But it has not yet been conclusively demonstrated that BCG is such an agent.

This is the fifty-fourth of a series of special issues of PUBLIC HEALTH REPORTS devoted exclusively to tuberculosis control, which appear in the first week of each month. The series began with the Mar. 1, 1946, issue. The articles in these special issues are reprinted as extracts from the PUBLIC HEALTH REPORTS. Effective with the July 5, 1946, issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 10 cents a single copy. Subscriptions are obtainable at $1.00 per year; $1.25 foreign.

Moreover, efforts to find more stable and suitable immunizing agents are going forward. Indiscriminate use of BCG here could, we believe, not only negate its potential future application but might divert attention from the control activities which are serving the Nation well and which, under the circumstances prevailing in the United States, could lead to the virtual eradication of tuberculosis. It is our feeling that we must be very careful not to imperil the gains we are making with proved control methods, and must not relax in any area the pursuit of case finding and treatment to care for the sick and to protect the well.

If the use of BCG in the United States is to contribute more information than has been gained in almost 30 years of use elsewhere, vaccination programs must be carefully planned. It would be desirable if State and local health departments which are immediately responsible for tuberculosis control were to develop plans for the use of the vaccine in their jurisdictions and keep records of those who are vaccinated. A beginning has been made in Wisconsin where the State Health Department has reviewed all requests for the vaccine desired from research laboratories, and in New York where the State Department of Health has manufactured BCG vaccine and has kept records of persons in the State who were vaccinated.

We feel that mass BCG vaccination campaigns are not indicated in this country where tuberculosis morbidity and mortality rates are relatively low (*3*). It is our recommendation that vaccination be limited to those persons who are particularly vulnerable to exposure. These include:

1. Those physicians, nurses, laboratory workers, hospital employees, and others who are exposed by occupation.
2. Those individuals or groups exposed to continued contact with tuberculosis.
3. Patients, inmates and employees of institutions, such as mental hospitals and prisons, in which case-finding programs indicate that exposure to tuberculosis is likely to be high.

ROBT. J. ANDERSON, *Medical Director,*
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Further Observations on Histoplasmosis

Mycology and Bacteriology

By Michael L. Furcolow, M. D.*

Recent studies of the fungus *Histoplasma capsulatum* have indicated that human infection with the organism may manifest itself in a variety of ways. The largest number of people affected, however, fail to show any clinical symptoms of the disease, and the only evidence that an infection has been present at some time in the past is sensitivity to the skin-testing antigen, histoplasmin, and quite frequently, calcified areas in the lungs or hilar lymph nodes. Findings of this nature are most common in the States bordering the Mississippi River and its larger tributaries, particularly in the Kansas City area where about 80 percent of the population are positive histoplasmin reactors (*1, 2, 3*).

With an infection so common in a subclinical form, one would expect to find at least a few instances of clinical disease. And, indeed, cases of fatal histoplasmosis have been reported from time to time. More recently, too, histoplasmosis has been diagnosed in patients who recovered from severe clinical infections with the fungus (*4–12*).

An earlier publication by Bunnell and Furcolow (*4*) reported on ten patients in the Kansas City area from whom *H. capsulatum* was recovered. The clinical material was presented with respect to the outcome of the disease in order to indicate that the infection is not invariably fatal, as was formerly thought.

During the last 2 years, an attempt has been made to obtain further information about clinical infection with *H. capsulatum* in the Kansas City area. From the large number of hospital and private patients referred as histoplasmosis suspects, those who showed a positive serological reaction to the histoplasmosis complement fixation test were selected as subjects for study. These patients were examined repeatedly by various tests in a search for the etiologic organism. However, it was not always possible or appropriate to follow the same procedure with all patients, since the type of examination very frequently depended upon the pathological condition from which the patient suffered. In some instances, sputum, gastric aspirations, or tissue biopsies were available for study, while in others, bone marrow aspirations were obtained for culture and animal inoculation. When autopsy material was available, tissue sections and pooled organs were studied pathologically, bacteriologically, and by animal inoculation.

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The six patients selected for discussion in this paper are those from whom at least one specimen was found to be positive for *H. capsulatum*. The complete clinical histories of these patients, when added to the previously published cases, indicate that, in the Kansas City area, the fungus *H. capsulatum* may be found in some patients who are clinically sick either with histoplasmosis or some other, possibly unrelated disease. Such findings indicate that the fungus may be found in a wide variety of clinical conditions without reference to a diagnosis of histoplasmosis.

In the light of this observation, it would be interesting to know how often the organism could be found in apparently healthy people if the search for the fungus were as diligent as it was in the subjects of this study. One might speculate, too, on the possible relationship of histoplasmosis to other granulomatous diseases, Hodgkins disease for example, where the etiology is still unknown. Certainly, one of the most pressing questions is how to evaluate the diagnostic significance of the recovery of the fungus in the presence of another disease. Should it be considered an incidental finding of academic rather than practical importance, or does the presence of the fungus influence in some way the onset or course of the predominant clinical disease?

In the clinical histories which follow, information about the six new patients (cases 11–16) is presented in terms of the certainty and possible significance of the diagnosis, rather than in terms of survival, as in the earlier case report study. Follow-up reports of the five surviving patients in the previous group (cases 1–5) are also included to bring the information up to date.

Previously Reported Cases

Case 1. C. D., white male, age 13 when first seen in February 1945. When discovered in a survey of school children in Kansas City, he was found to have miliary pulmonary infiltrations with bilateral hilar adenopathy (fig. 1), and positive histoplasmin and negative tuberculin skin tests. In spite of X-ray findings, he was essentially in good health. After 10 days' hospitalization, he was discharged and kept under supervision for laboratory examinations. *H. capsulatum* was grown from a culture of a gastric specimen in November 1945. Follow-up skin tests on October 4, 1948, showed a negative reaction to tuberculin and blastomycin, but a positive reaction to histoplasmin. The blood complement fixation tests have been suspicious (+++ or ++) on five occasions, and negative once since the last report. No further efforts have been made to isolate any organisms, as the film (fig. 2) shows miliary calcifications, almost completely healed, with very little infiltration surrounding the calcified lesions. This boy is still in good health and was attending school in March 1950.

Case 2. W. B., white male age 5 months when admitted to the hospital in March 1947 with fever, otitis media, hepatomegaly and splenomegaly. Cultures of blood and sternal marrow obtained on the 20th hospital day were positive for *H. capsulatum.* Slow improvement followed 7 weeks of spiking fever, and the patient was discharged after 9½ months of hospital care. This child has continued to be in excellent health (except for one cold) and has gained 11 pounds since discharge from the hospital December 30, 1947. His chest film has never showed any abnormal shadows; a follow-up film on January 16, 1950, was still negative. He has had one negative tuberculin and three positive histoplasmin skin tests since the last report. Of six complement fixation tests, three were positive, two suspicious, and the most recent one (January 1950) negative.

CASE 3. S. P., white female, age 20 months when seen March 23, 1947. Four months before hospitalization, she had a febrile episode described as influenza, followed by malaise and abdominal distension. On admission, she had fever, anemia, and enlargement of the liver, spleen, and peripheral lymph nodes. The chest film revealed an infiltration in the right base, and right hilar adenopathy. On the 90th hospital day the spleen was removed, and positive cultures for *H. capsulatum* were obtained from the surgical specimen as well as from later gastric aspirations. This child has exhibited continued improvement since the operation. She has been well, gaining weight, and is free of symptoms. Skin tests August 16, 1949, showed negative tuberculin and positive histoplasmin reactions, while a chest film February 18, 1950, revealed definite calcification in the right base and hilar lymph nodes. (These X-rays are not presented because of their unsatisfactory reproduction quality). Complement fixation tests October 18, 1948, August 16, 1949, and February 18, 1950, were negative.

Comment. As noted, the disease was mild in case 1 and severe in cases 2 and 3. Complement fixation tests and histoplasmin skin sensitivity tests were positive, and diagnosis was confirmed in all three cases by recovery of the fungus during the illness.

CASE 4. G. M., white male, age 52. This patient was referred for study in October 1947, because of unexplained pulmonary lesions (fig. 3), negative tuberculin and positive histoplasmin skin tests and a positive (++++) complement fixation for histoplasmosis. The patient continues to be chronically ill with recurrent attacks of what he calls "influenza." These are characterized by fever (102°–103°), cough, anorexia, and increased sputum production. His weight has fallen progressively from 129 pounds in January 1948 to 104 in April 1950. He continues to have an elevated afternoon temperature, but is able to get about the house and to take occasional rides in his car. Further laboratory work since the last report includes 5 guinea pig inoculations which were negative for tuberculosis and negative cultures for tubercle bacilli on 10 sputum specimens, 2 gastric washings, and 1 skin biopsy; 11 out of 16 sputum specimens were positive for *H. capsulatum,* while 2 gastric washings and 1 bronchoscopy specimen were negative for fungi; 4 of 9 mice and 1 of 7 rats inoculated with the sputum specimens were positive for *H. capsulatum.* Blood complement fixation tests were positive on 10 occasions, the last of which occurred October 6, 1949. The chest film shows slowly progressive increase in the bilateral disease with cavitation in both lungs (fig. 4).

Comment. This case is of particular interest because of the similarity to chronic, slowly progressive, cavitary tuberculosis. However, repeated laboratory examinations have failed to demonstrate tubercle bacilli. Histoplasmin sensitivity, the presence of complement-fixing antibodies, and positive sputum cultures for *H. capsulatum* corroborate the diagnosis of histoplasmosis.

CASE 5. R. J., white male, age 64. Additional history obtained since the previous report reveals that this man was admitted to a hospital June 3, 1943, because of cough, dyspnea, and loss of weight. An X-ray at that time showed bilateral apical infiltrations with possible cavity in the right first interspace, pleuritic changes in the right base and mediastinal shift to the right (fig. 5). He was referred to a tuberculosis sanatorium with a diagnosis of far-advanced tuberculosis (without laboratory work), but he refused to go. His next brief stay in the hospital (December 5, 1947, to January 7, 1948) was described earlier. On November 25, 1948, he became comatose while eating dinner and was readmitted to the hospital for several weeks. No new physical findings were noted at this time. Although his general condition was poor, he left against advice, but was persuaded to return on April 18, 1949, for a course of bacillomycin (Wyeth). At that time, there was extensive cavitation in the right lung, with marked retraction of the mediastinum to the right, scattered fibrocalcific lesions in the left with emphysema and residual apical pleural changes (fig. 6).

Skin tests again showed a positive reaction to histoplasmin and a negative reaction to tuberculin. Blood studies revealed a sedimentation rate of 33 mm.; red cell count of 3,900,000 per cu. mm., with 10.5 grams of hemoglobin; white cell count of 15,000, with 83 percent polymorphonuclear leukocytes; and a positive (++++) complement fixation test. Bacillomycin, 100 mg., with 2 percent procaine, was given intramuscularly every 6 hours beginning April 19, 1949, but was discontinued after 48 hours because of intense cellulitis at the site of injection and general malaise, chills, and fever. Thereafter, the patient seemed to improve on sulfadiazine therapy, but on May 1, 1949, he suddenly developed convulsive seizures and died. During his various admissions, a total of 24 sputum specimens were negative on culture for tubercle bacilli, while 13 out of 17 sputum cultures were positive for *H. capsulatum.* Two gastric specimens were negative for tubercle bacilli, and 1 out of 5 were positive for *H. capsulatum.* Animal inoculations with sputum specimens were positive for *H. capsulatum* in 4 of 14 mice and 6 of 6 rats, while 8 guinea pigs were negative for tuberculosis.

Autopsy revealed histoplasmosis of lungs, adrenals, and spleen, and no evidence of tuberculosis.

Comment. This is another cavitary case in which autopsy examination confirmed the diagnosis of histoplasmosis.

The only new finding that can be reported now on case 6 is that organisms typical of *H. capsulatum* have been identified pathologically in lung tissue. Tuberculosis was also diagnosed in this case, in which the lesion was confined to the right lower lobe (fig. 7).

No follow-up material is given for cases 7–10 since these patients died prior to publication of the previous paper and their reports were complete. However, X-ray reproductions are presented for cases 7, 8, and 10 (figs. 8–11).

For case 7 (figs. 8 and 9) both tuberculosis and histoplasmosis were proved at autopsy. Case 8 (fig. 10) was diagnosed at autopsy as Hodgkins' disease and histoplasmosis. Case 10 (fig. 11) represents a case of disseminated histoplasmosis proved by autopsy.

New Cases

Severe Clinical Illness With Recovery

CASE 11. D. S., white male, age 4 years. This child has lived all his life on a farm bordering the Kansas River, about 36 miles northwest of Kansas City. When referred for study, he was recovering from an illness diagnosed as miliary tuberculosis.

History. Patient had rapid breathing, cough, fever, and abdominal pain 3½ weeks before admission, and symptoms persisted in spite of sulfadiazine and penicillin treatment. He was admitted to a neighboring hospital August 22, 1946, where examination revealed dyspnea, enlarged spleen, and fever of 103°. X-rays showed multiple patches of increased density in both lungs, suggesting miliary tuberculosis. Temperature spiked up to 104° the first 2 days, then went gradually lower, with daily spikes of at least 101° during the entire 16 days of hospitalization, although the patient improved clinically. A tuberculin test proved negative, while a histoplasmin skin test was doubtful (erythema only). The parents' X-rays and tuberculin tests were negative. Patient was referred for further study.

First admission. September 11, 1946. Examination was essentially negative except for palpable spleen. Chest X-rays revealed miliary, soft infiltrates throughout both lungs and enlarged hilar lymph nodes (fig. 12). The patient's temperature occasionally rose to 99° during the hospital stay. The red blood cell count was 3,650,000 per cu. mm., with 12 grams hemoglobin; and the white cell count was 12,900 with 54 percent polymorphonuclear leukocytes, 38 percent lymphocytes, 2 eosinophils, 2 basophils, and 6 monocytes. The erythrocyte sedimentation rate was 35 mm. in 1 hour. Urine was negative. The patient was discharged after 6 days.

Second admission. October 16–19, 1946 (to obtain 3 gastric washings for culture). The patient's temperature continued to rise in the afternoon to 99°. He still complained of occasional headaches and malaise. Examination revealed that the tonsils were enlarged and infected, and that both the liver and spleen were easily palpable. X-ray showed the continued presence of miliary infiltrations which appeared to be somewhat more clearly defined and "harder."

Blood count showed 5,140,000 red blood cells per cu. mm., with 84 percent hemoglobin, and 12,500 white blood cells with 39 percent polymorphonuclear leukocytes, 57 percent lymphocytes, 1 eosinophile, and 2 monocytes.

Skin tests. Tuberculin skin tests were negative on August 25, 1946 (during the first illness) and on five subsequent occasions, the last of which was in August 1947. The parents had negative tuberculin tests and chest X-rays. The patient's histoplasmin test was doubtful (erythema only) on August 25, slightly positive on September 11, and definitely positive on October 17, 1946. Three subsequent positive tests were reported, the last of which occurred in August 1947. Two tests with blastomycin were negative, as were tests with extracts of *Alternaria* and *Hormodendron.*

Complement fixation tests. Blood obtained on August 12, 1947, showed a positive (++++) complement fixation test, as have four subsequent blood samples. The last blood test (Decemter 28, 1949) proved suspicious (+++).

Mycology and bacteriology. During the two hospital admissions, smears and cultures for acid-fast organisms were performed on five gastric specimens. One hamster was inoculated with these specimens and was negative at autopsy. Ten gastric and one bone marrow specimens, two nose and throat cultures, and four blood cultures were negative for pathogenic fungi. Culture of the tonsils (removed January 29, 1948) revealed typical colonies of *H. capsulatum* on several plates. Autopsy examination of four mice inoculated with tonsillar tissue proved negative, as did culture of organs.

Course. The patient improved progressively during observation. His spleen gradually regressed, afternoon fever disappeared, and he showed progressive gain in weight. By April 22, 1947, the sedimentation rate was normal, and the chest X-ray showed the lesions to be well defined and nodular. By January 1948, calcification had appeared in the center of the infiltrates. By December 1949, much of the soft infiltrate surrounding the calcified centers had disappeared and the picture was typical of "miliary calcification," with more than 100 separate small calcified areas visible in each lung field (fig. 13).

On the routine visit in January 1948, the patient's mother stated that the child's local physician had advised the removal of his tonsils because of repeated attacks of upper respiratory infection. This was done on January 28, 1948, and the tonsils were placed in saline solution and shipped to the laboratory where they were received the next day. Cultures of these tonsils were positive for *Histoplasma.* Pathological study revealed granuloma, but *Histoplasma* have not been definitely identified. The subsequent course of the patient's illness to the point of recovery was uneventful. When last seen on December 28, 1949, the patient weighed 68 pounds and appeared in excellent health.

Comment. One of the most interesting aspects of this case is the way in which the etiological agent was found—culture of tonsils removed 18 months after the acute onset of disease. All other attempts to isolate a causative agent failed. Nevertheless, the chest film showed evidence of an active, widespread inflammatory process, similar in appearance to that of case 1 (fig. 1), where a positive culture was found from gastric washings. The difficulty of recovering organisms from sputum or gastric washings in cases where there is apparently a great deal of scattered infection throughout the lungs cannot be explained at this time.

Moderately Severe Clinical Illness With Recovery

CASE 12. E. A.,[1] white female, 41 years old. This patient, a housewife, lived in Chase County, Kans., for 30 years before moving to southern California, where she lived for 11 years. In November 1948, she returned to Chase County and then settled in southern Missouri in January 1949. She was studied because of atypical findings in her X-ray.

History. The patient now lives in a house which, up to the time she occupied it in January 1950, had been vacant for 3 or 4 years. This was an oak clapboard house which was unpainted when the patient moved in and contained a great deal of dust, debris, some rotting wood, and many mud-wasps' nests. It was located in scrub-oak timber about 5 miles from a paved highway. From January 1 until the onset of her illness, the patient was engaged in house cleaning, sweeping, and removing wallpaper.

On March 22, one day after exposure to rain, the patient suffered from fever and chills. Her temperature rose to 102° and was accompanied by sweating, chest pain, and a nonproductive cough.

This condition persisted for about 3 days without change. When she failed to improve, the patient consulted a physician March 25, 1949. Physical examination at this time showed injection of the posterior pharynx and right cervical lymphadenopathy. Urine examination was negative, and blood agglutinations were negative for tularemia, typhus, and undulant fever. A diagnosis of upper respiratory infection was made and a cough syrup was prescribed.

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[1] Reported through the courtesy of Mrs. Ilse Heilbrunn and Dr. A. R. Cain, Lockwood Memorial Hospital, Lockwood, Mo. They will report this case in detail later.

The patient continued to have fever (up to 102°), with chills, chest pain, and a much harder cough. She consulted her physician again 5 days after the first visit and he referred her to the hospital.

Admission findings. April 1, 1949. Physical findings were essentially negative. A blood count showed 4,350,000 red blood cells per cu. mm. with 12 gm. hemoglobin, and 11,150 white blood cells per cu. mm. with 48 percent polymorphonuclear leukocytes, 25 percent lymphocytes, 3 percent monocytes, and 3 percent eosinophils. Repeat counts showed no marked change. Agglutination tests for tularemia, typhus, and brucellosis were again negative April 12, 1949. Urine was negative. The first X-ray taken on admission showed multiple, ill-defined areas of infiltration in both lung fields and pleurisy at the left base (fig. 14).

Skin tests. Tuberculin and histoplasmin skin tests were positive on two occasions—April 16 and May 16, 1949. Coccidioidin skin tests were negative twice, as was one blastomycin skin test.

Complement fixation tests. Sera of April 7, April 19, and September 21, 1949, gave a positive (++++) complement fixation for histoplasmosis, while those obtained on May 17, June 29, July 15, 1949, and February 17, 1950, gave a suspicious (+++) complement fixation. Serum of May 23, 1950 was negative.

Mycology and bacteriology. A small specimen of sputum was obtained April 7, 1949, and was received in the Kansas City laboratory the following day. This yielded positive cultures of *H. capsulatum.* Sputum was reported as negative for tubercle bacilli by the Missouri State Public Health Laboratory.

Course. The patient's temperature was 102° on admission to the hospital (April 1, 1949). She received duracillin, 1 cc., intramuscularly twice a day for 6 days, and 1 gram sulfadiazine every 4 hours. Her temperature gradually fell to normal, and she was discharged after 10 days. She produced very little sputum throughout the course of her illness. X-rays taken 5 days after admission revealed that the pleurisy at the left base had disappeared and definite clearing of the lung lesions was evident by April 9, 1949. Clearing was more marked by April 15, 1949, and by July 3, 1949, the lungs were largely cleared although several small infiltrates could be outlined upon close inspection. These appeared to be definitely "harder" and more circumscribed than on the original films. By December 8, 1949, only a small fibrotic strand in the left second interspace could be seen.

On or about April 20, the patient developed pain in the left wrist following a strain. Later, pain and swelling appeared in the right wrist, elbow, and shoulder; and still later in the right ankle. Subsequently, the left ankle developed pain and swelling as well. The pain and swelling gradually disappeared from all parts except the ankles, which were still painful and swollen on June 29.

About April 27, a rash which resembled poison ivy appeared on the patient's right forearm and hand. Large blisters developed and slowly disappeared in the course of 3 weeks. These symptoms resembled in every way the patient's previous attacks of poison ivy.

About May 1, hard red "bumps" developed under the skin in the left calf. Later, a number of these developed about the left ankle, and then one appeared on the right calf and another on the inner aspect of both knees. One also developed on the shin. These lesions were red, firm, and indurated, slightly painful, and up to one-half inch in diameter. They disappeared slowly during the last week in May.

At the present time (March 1950), the patient has no complaints and feels well.

Her cough and chest pain are completely gone and she is carrying on her normal work as a housewife.

Comment. This case is considered probable histoplasmosis because of the clinical picture of an acute respiratory infection following exposure to dust, positive complement fixation and skin tests, recovery of the fungus in a sputum specimen taken during the height of the infection, and the rapid resolution of the pulmonary infiltrates. It will be interesting to follow this patient to see if calcification occurs during the next few years. Unfortunately, studies for tuberculosis were not complete in this case. The migratory type of arthritis which occurred 3 weeks after the first injection of duracillin was thought to be an allergic type of reaction to the antibiotic.

Moderately Severe Clinical Illness, Recovery Questionable

CASE 13. W. W.,[3] white male, 64 years old. This patient, a laborer, had lived for 11 years in Kansas City about 30 years ago, but had since lived in the southeastern part of Kansas, some 200 miles from Kansas City. He was studied because of a positive complement fixation test for histoplasmosis.

History. The patient complained of hoarseness of 9 months' duration, associated with cough and sputum, which was occasionally tinged with blood. For 6 months he had had occasional chest pain on the right side and had lost 25 pounds. There was no significant past history of pulmonary disease except for an uncomplicated pneumonia in 1944.

Admission findings. September 6, 1949. Patient was well-developed but had marked hoarseness, barrel chest, and clubbing of the fingers. Breathing was diaphragmatic, with considerable intercostal retraction, and there were rales in the right base. Liver and spleen were not palpated. Temperature was 98.8° on admission. The red blood count was 5,000,000 per cu. mm. with 72 percent hemoglobin; and the white blood count was 9,500 with 72 percent polymorphonuclear leukocytes, 20 percent lymphocytes, 3 eosinophils, and 5 monocytes. The sedimentation rate was 24 mm. in one hour (Cutler method). Urine and Wasserman were negative. X-rays of the chest showed infiltration in the left lower lobe, with enlarged left hilar lymph nodes (fig. 15). There were some pleural changes in both bases.

Skin tests. Tuberculin skin tests were negative and histoplasmin tests positive on the 69th, 92d, and 125th day of hospitalization. Blastomycin and coccidioidin skin tests were negative on the 92d day.

Complement fixation tests. Sera obtained on November 17, 1949 (72d hospital day), November 28, December 7, 14, and 28 all gave a positive (++++) complement fixation for histoplasmosis. Nine subsequent tests (the last on February 27, 1950) were positive (++++) on three occasions, and suspicious (+++ or ++) on six.

Mycology and bacteriology. Seventeen sputa were negative for acid-fast organisms by smear, and 2 were negative by concentration. Four cultures for acid-fast organisms were negative, as was guinea pig inoculation. Nine of 15 sputum specimens were positive for *H. capsulatum* by culture. Fifteen mice were inoculated with sputum, of which five were positive for *H. capsulatum.* One laryngeal biopsy culture was negative for fungi.

Course. The admission diagnosis was carcinoma of the larynx or tuberculosis. On the 20th hospital day the diagnosis of inoperable carcinoma of the larynx was made by direct laryngoscopic examination. Biopsies of that date and of the 58th day were diagnosed as probable tuberculosis because of the presence of acute and chronic granulation tissue, although no acid-fast organisms were found. Later study of the slides revealed the presence of many doubly refractile cells typical of *H. capsulatum* in the mononuclear and giant cells. A third biopsy January 4, 1950, showed similar findings. On the 25th hospital day the patient was transferred to the tuberculosis ward, where he received streptomycin (0.5 gm. twice daily) for 42 days, followed by dihydrostreptomycin (0.5 gm. once daily) for 42 days. His temperature varied between normal and 100°, and persisted at 99° most of this time. His sputum decreased in amount although it remained profuse. On the 96th hospital day January 4, 1950, the dihydrostreptomycin was discontinued and another laryngeal biopsy was performed. Following this, tracheotomy was necessary because of edema of the larynx. The patient improved, and tracheotomy tube was finally removed on the 129th hospital day. A film of January 31, 1950 showed marked clearing of the left lower lobe (fig. 16). Patient was discharged, much improved, on March 9, 1950, after 160 days in the hospital, and was to return only for out-patient observation. His hoarseness and cough had disappeared and his general appearance had improved greatly.

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[3] Reported through the courtesy of Dr. Sam Roberts, Kansas City, Mo.

Comment. Although the admission diagnosis in this case was laryngeal carcinoma, biopsy sections were thought to show tuberculosis, and the patient was treated with streptomycin. When positive complement fixation tests for histoplasmosis were encountered, however, the laryngeal sections were re-examined and typical *H. capsulatum* organisms were seen in the phagocytic cells. Positive sputum cultures later confirmed the diagnosis of histoplasmosis.

Severe Clinical Illness with Death from Embolism

CASE 14. G. P.,[3] a 69-year-old farmer who had lived all his life on farms within 32 miles of Kansas City. He was studied because of a positive complement fixation test for histoplasmosis.

History. The patient had had asthma all his life. For the past 10 years he had had gradual onset of fatigue, weakness, cough, shortness of breath, and pain in the chest. These symptoms became progressively worse, and the patient was finally unable to work. He had also noted gradual onset of nocturia and had for several years experienced difficulty in urinating. About 8 weeks before admission, he had had an acute episode of fever and pain in the left side of the chest and had suddenly become hoarse. One month before admission, he had been admitted to another hospital where he remained 11 days. He ran a low grade fever (up to 101°) during hospitalization, and his general condition remained unchanged. X-rays of his lungs showed "generalized granularity throughout both lung fields." Electrocardiogram suggested auriculo-ventricular conduction defect. Laryngoscopy revealed a mass which was diagnosed as carcinoma of the larynx. Biopsy of this mass was reported as suspicious of malignancy. Three sputum smears for acid-fast bacilli were negative.

Admission findings. December 13, 1949. Temperature was 101.4°, voice was very hoarse, patient had marked hearing difficulty, and there were rales and impaired resonance at the base of the right lung. Liver and spleen were not felt. Laryngoscopic examination revealed granulomatous involvement of the right vocal cord, with edema of the larynx. The red blood cell count was 5,330,000 per cu. mm. with 78 percent hemoglobin. The white blood count was 7,400 with

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[3] Reported through the courtesy of Dr. A. W. Eklund, Pleasant Hill, Mo.

74 percent polymorphonuclear leukocytes, 18 percent lymphocytes, 1 eosinophil, 1 basophil, and 6 monocytes. Urinalysis was negative. X-rays of the chest showed the same diffuse granularity throughout both lungs which had been previously noted. (Films were not suitable for reproduction.)

Skin tests. Tuberculin test was negative and histoplasmin test positive 1 month before admission and on the day of admission. Blastomycin and coccidioidin tests were also negative on the day of admission.

Complement fixation tests. Serum drawn November 16, 1949, gave a positive (++++) complement fixation for histoplasmosis. Five subsequent sera have given the same result, including serum obtained post mortem.

Mycology and bacteriology. Review of the sections removed at biopsy of the larynx November 18, 1949 revealed the presence of intracellular organisms typical of *H. capsulatum.* Eight sputum specimens were negative for acid-fast bacilli by smear, as were six by culture. One guinea pig was negative for tuberculosis. Twenty of twenty-two sputa were positive for *H. capsulatum.* Four of six mice inoculated with sputum were also positive. Combined portions of both lungs and both adrenals obtained post mortem were negative for tuberculosis by culture and guinea pig inoculation. *H. capsulatum* was cultured from blood and from eight tissues (brain, combined lungs, liver, spleen, heart, larynx, mediastinal lymph node, and combined adrenals) obtained post mortem. Two mice were injected with the combined tissues and were found positive for *Histoplasma.*

Course. The patient's temperature, which was 101° on admission, continued to rise daily to 100° or 101° during his entire hospital stay. He had a persistent cough, with sputum. He received 50,000 units of penicillin every 3 hours. On the third hospital day, retention of urine was noted and an indwelling catheter was inserted. Electrocardiogram revealed right bundle branch block. Swelling of both feet and lower legs was noted on the fifth hospital day, but this subsided under hot wet packs and elevation of the legs. Sulfadiazine and urea were started on the ninth hospital day, and on the same day bacillomycin (50 mg. per cc.) was started by aerosol. There was no immediate reaction, but the bacillomycin was discontinued after 4 days because of respiratory distress. On December 27 (14th hospital day) the patient suddenly developed cyanosis and difficulty in breathing, followed by collapse and death.

Autopsy findings. Thrombosis of the right iliac vein, with pulmonary embolism, granulomatous laryngitis and tracheitis, caseation necrosis of both adrenal glands, and hypertrophy of the prostate. Microscopic examination revealed the presence of typical *Histoplasma* organisms throughout all the tissues.

Comment. As in the immediately preceding case, this patient was admitted with a diagnosis of laryngeal carcinoma and biopsy sections were intepreted as showing changes probably consistent with malignancy. Positive histoplasmosis complement fixation tests, however, suggested a review of the tissue slides which were seen to contain intracellular organisms morphologically identified as *H. capsulatum.* Repeatedly positive sputum cultures, as well as autopsy findings, confirmed the diagnosis of histoplasmosis.

Slight Clinical Illness with Death Due to Heart Disease

CASE 15. J. L., white male, 61 years old. The patient, a mechanic, had lived in Kansas City for 1 year. He had spent all the rest of his life in two small towns in southeast Kansas within 125 miles of Kansas City. He was studied because of X-ray findings suggestive of tuberculosis, a negative tuberculin test, and positive histoplasmin skin test.

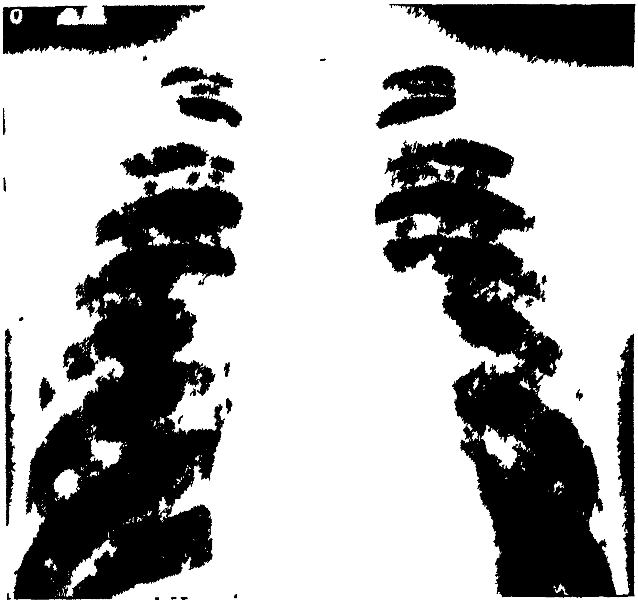


Figure 1. Case 1, April 10, 1945. Soft infiltrations throughout both lung fields with enlarged hilar nodes bilaterally.

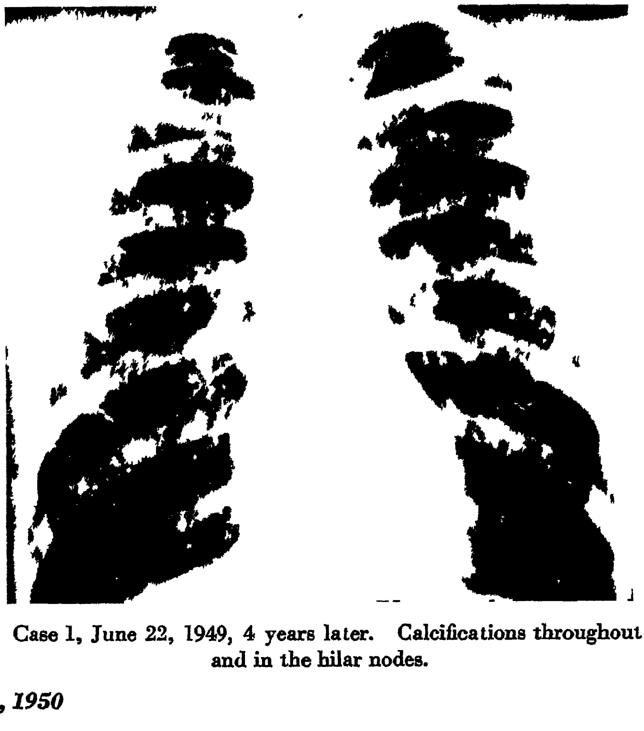


Figure 2. Case 1, June 22, 1949, 4 years later. Calcifications throughout the lungs and in the hilar nodes.

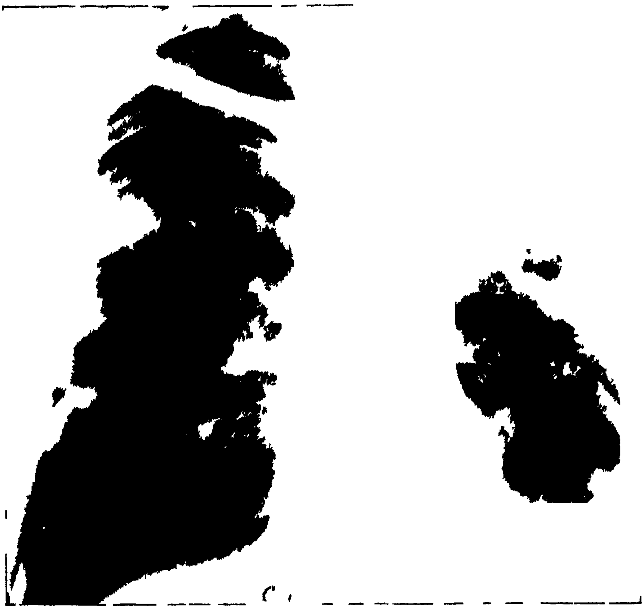


Figure 3. Case 4, October 23, 1947. Infiltrations in the left lung with questionable cavitation, pleuritic changes in the base and early spread to the right mid-lung field.

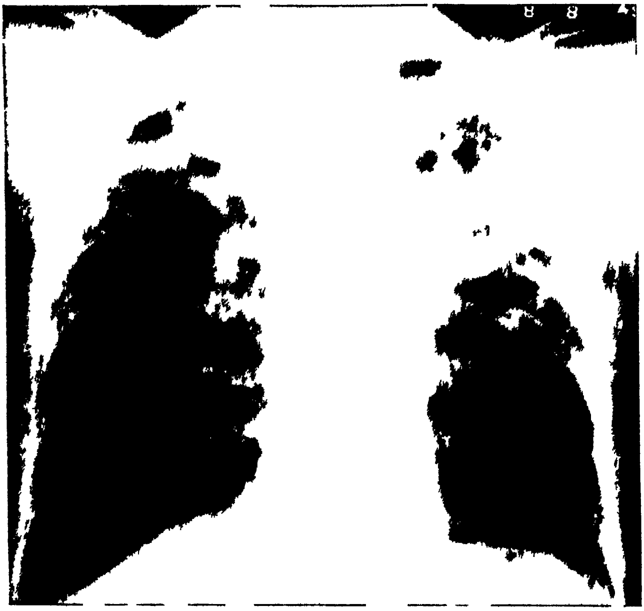


Figure 4. Case 4, August 8, 1949, 2 years later. Marked spread of disease in both upper lungs with cavitation and pleurisy. Some clearing in the left base.

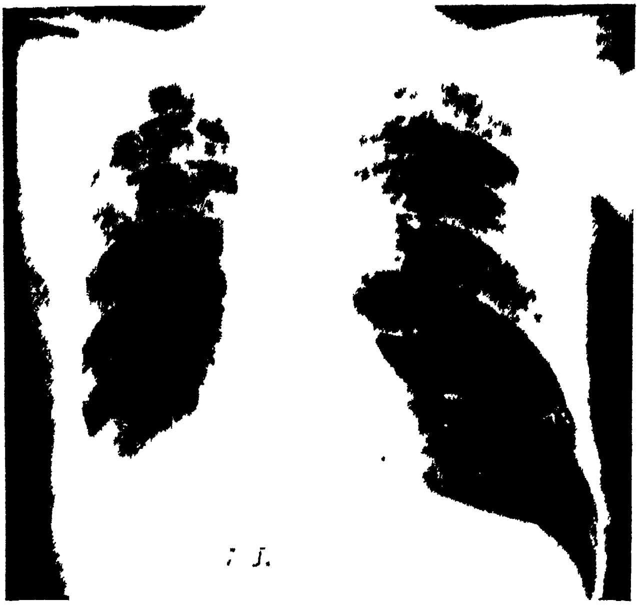


Figure 5. Case 5, June 10, 1943. Scattered infiltrations in both lung fields with probable cavitation in the right first interspace, pleurisy in the right base and mediastinal shift to the right. Note calcifications in the left hilum.

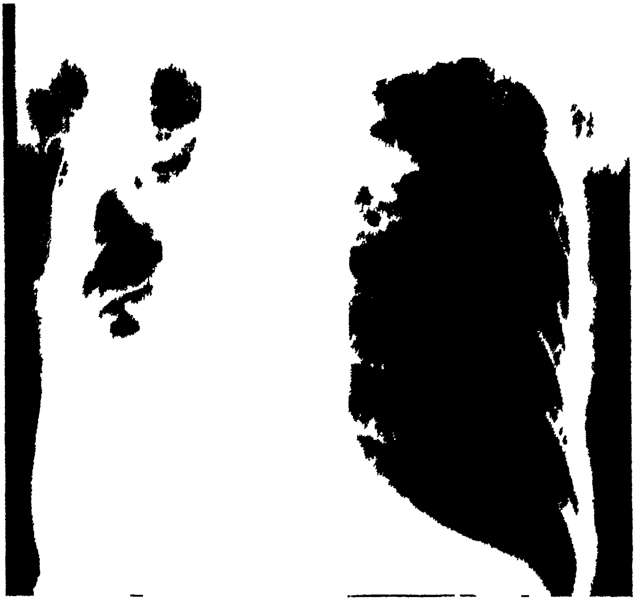


Figure 6. Case 5, November 23, 1948, 5½ years later. Marked progression of destructive disease in the right, with giant cavity and further retraction of mediastinum. Clearing in the left with scattered calcifications, emphysema and residual apical pleuritic changes.

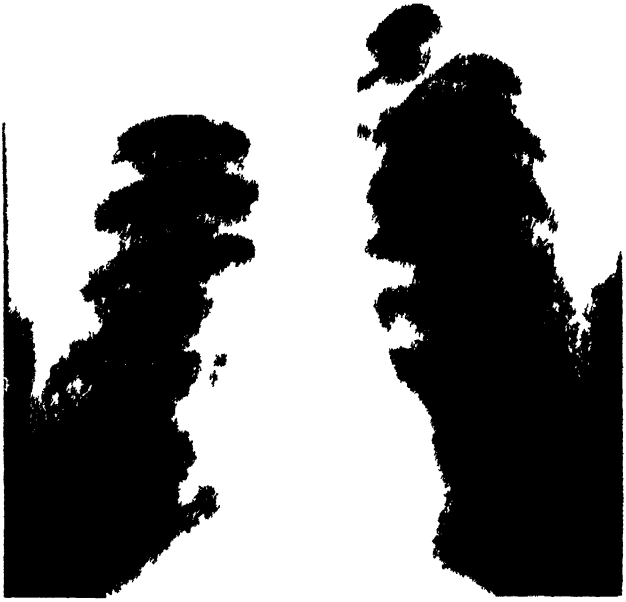


Figure 7 Case 6, June 14, 1947 Infiltration in right hilum extending into right base

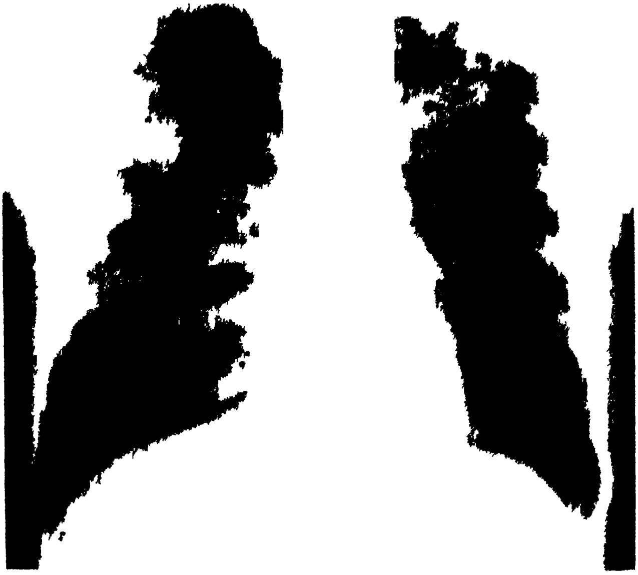


Figure 8. Case 7, March 15, 1945 Infiltration in right second interspace and left upper lobe with question of cavity in the left apex.

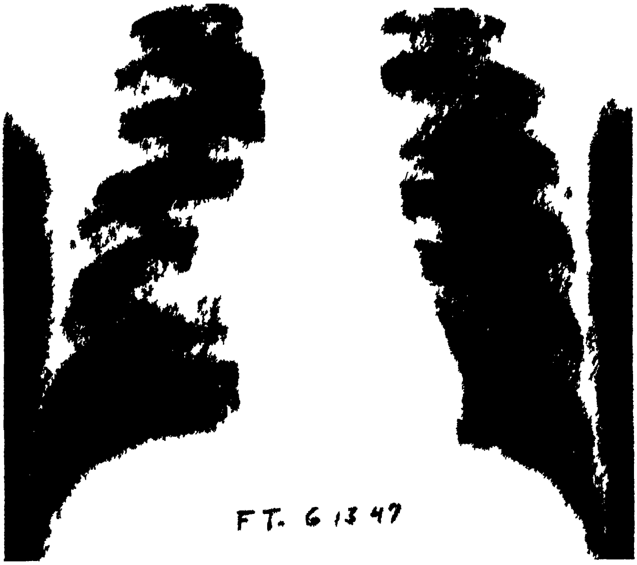


Figure 9 Case 7, June 13, 1947. 2 years later Nodular type of lesions throughout both lung fields with marked spread in the right lower mid lung field.

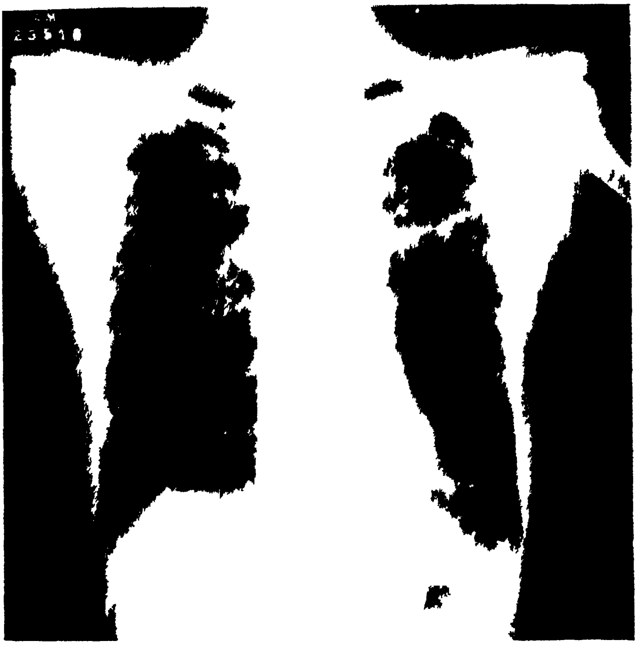


Figure 10 Case 8, July 22, 1947 Infiltrations in both lung fields, more marked on the left Note calcification in right upper hilum

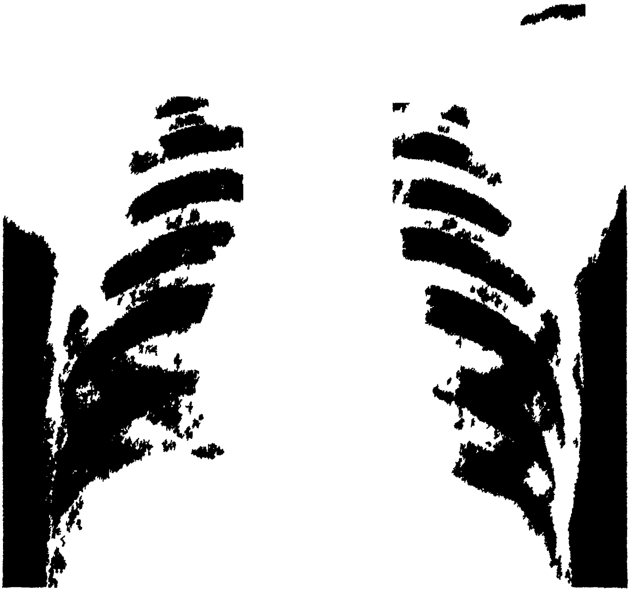


Figure 11. Case 10, November 3, 1947. Generalized fine "granular" lesions, more dense in the perihilar areas with fewer lesions in peripheral lung fields.

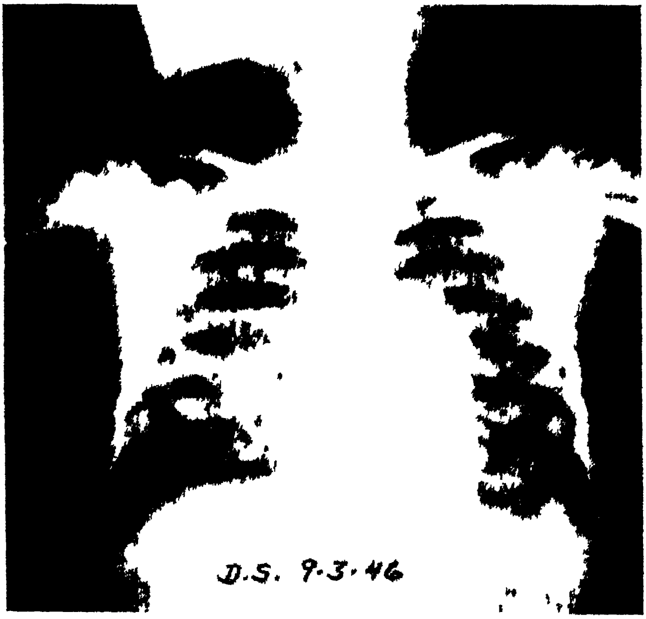


Figure 12. Case 11, September 3, 1946. Miliary infiltrations throughout entire chest with enlargement of hilar nodes bilaterally.

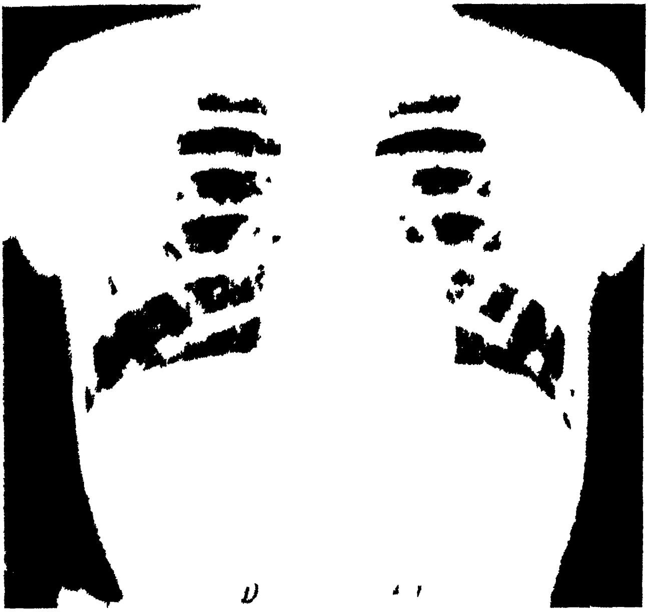


Figure 13. Case 11, December 28, 1949, 3 years later. Small miliary calcified areas throughout the lung fields. Note possible early calcification in the hilar nodes (cf. fig. 2).

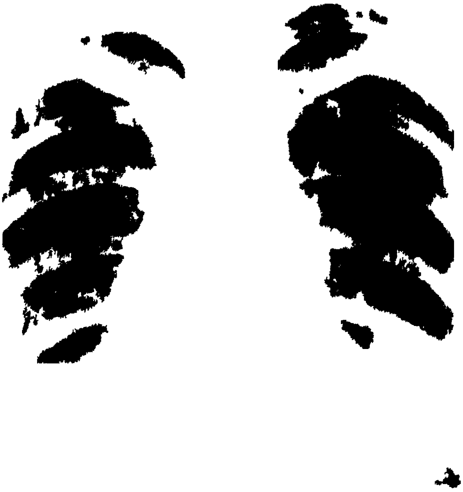


Figure 14. Case 12, April 1, 1949. Soft, ill-defined infiltrates in both lungs with pleurisy in the left base.

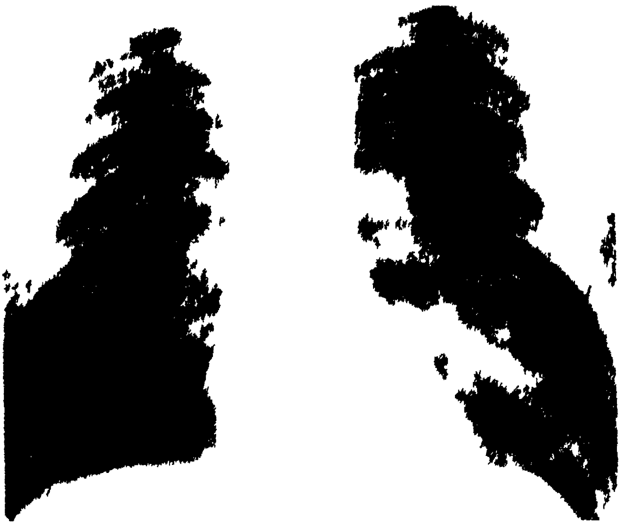
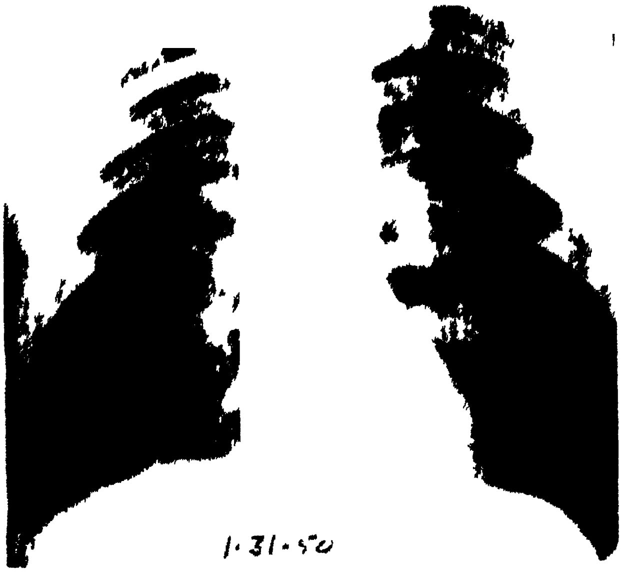


Figure 15. Case 13, September 6, 1949 Infiltration in the left hilar area extending into the mid and lower lung field and left base



1-31-50

Figure 16. Case 13, January 31, 1950, 4 months later. Marked clearing in the left lower lobe.

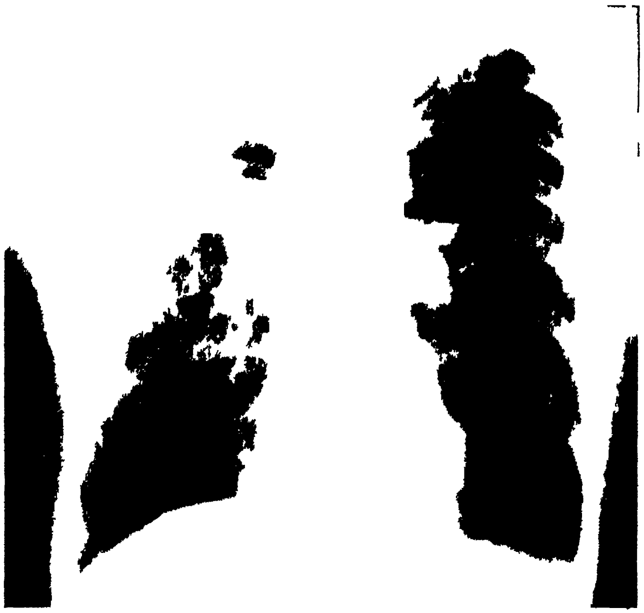


Figure 17. Case 15, November 13, 1947. Dense infiltration in lateral portion of right upper chest with areas suggestive of cavitation. Early infiltrates in the left mid lung field with old pleuritic changes in the base

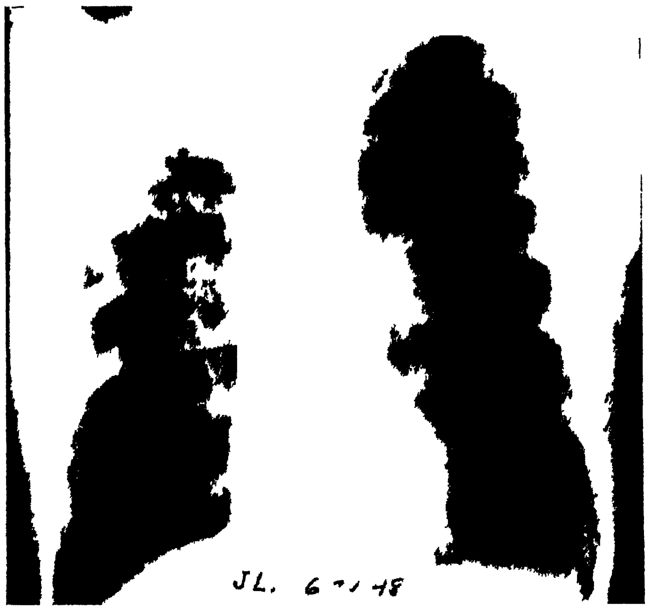


Figure 18. Case 15, June 22, 1948, 8 months later. Essentially no change in the right upper with probable cavitation still present. New infiltrations in the left hilum and lower mid-lung field and the right base.

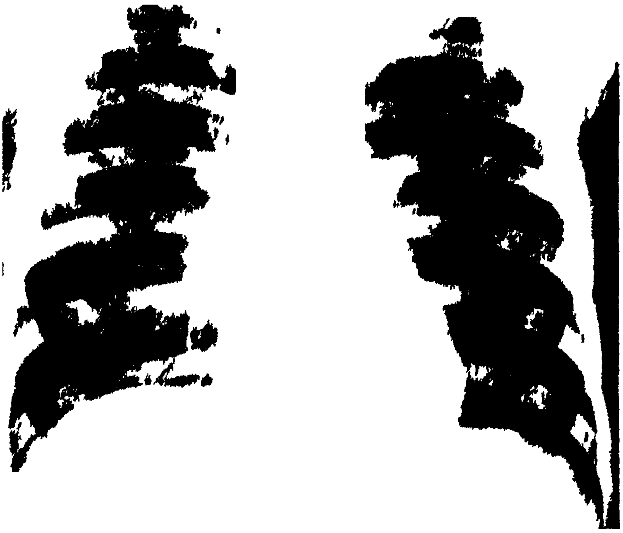


Figure 19. Case 16, March 3, 1948. Multiple soft infiltrates throughout both lung fields, more marked in the right upper.

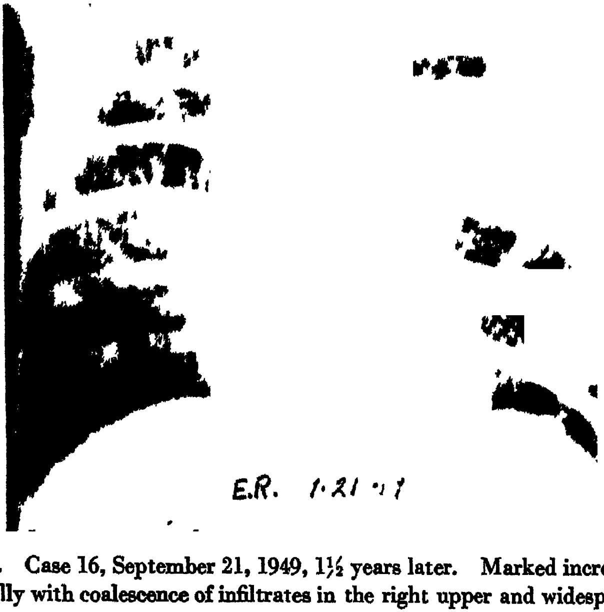


Figure 20. Case 16, September 21, 1949, 1½ years later. Marked increase in disease bilaterally with coalescence of infiltrates in the right upper and widespread scattered infiltrates in the entire left lung.

History. The patient's complaints were limited to progressive loss of vision, which had begun in the right eye and had gradually become worse during the previous 12 to 14 years. About 12 years before admission he had had an operation for cataract removal from the right eye without improvement in his vision. Since the operation, vision in the left eye had gradually failed. Patient had lost his left leg in an accident at 19 years of age and gave a vague history of "heart trouble" beginning 3 years before admission. He entered the hospital for cataract removal.

Admission findings. October 10, 1947. The right pupil was grossly distorted and there was an opacity in the left. Breath sounds were distant. There were no other significant findings. Blood pressure was 120/68 and temperature was 99°. The red blood count was not reported, but hemoglobin was 79 percent, and the white blood count was 8,700 per cu. mm. with differential not reported. The blood sedimentation rate was 30 mm. in 1 hour. Routine admission chest X-rays (fig. 17) showed dense infiltration in the right upper lung peripherally, and possible cavitation. The X-ray impression was far-advanced tuberculosis.

Skin tests. Tuberculin test was negative on the 19th hospital day, and the histoplasmin test was positive. Similar results were obtained on repeat tests 1 week later. Blastomycin test was negative at this time. Repeat tuberculin and histoplasmin tests at 5 and 7 months after admission gave similar results.

Complement fixation tests. A suspicious (+++) complement fixation test for histoplasmosis was found on the 20th hospital day. Similar results were found 1 and 5 months later, while positive (++++) fixation was obtained in the 8th, 11th, and 13th months after admission.

Mycology and bacteriology. Five gastric specimens were negative for tuberculosis by culture. Three of seven gastric specimens secured over a period of 5 months, as well as the only sputum specimen obtained, were positive for *H. capsulatum.* The first positive was obtained from the gastric specimen of April 4, 1948. Eight mice injected with gastric specimens were negative, as was a single blood culture.

Course. The cataract in the left eye was removed on November 6, 1947, and the postoperative course was uneventful. Patient ran a low-grade fever (99°–100°) during his hospital stay of 53 days, but had no other symptoms. Chest X-rays June 22, 1948, showed essentially the same dense, infiltration in the right upper field with a suggestion of cavitation, as had previously been noted, increased densities in the right base, and an acute infiltration in the left hilum spreading into the lower mid-lung field (fig. 18). He was discharged on December 10, 1947, to be followed in the clinic. The patient had several "heart attacks" after he left the hospital and suddenly expired during one of these attacks on November 16, 1948. The attending physician listed heart disease as the cause of death. An autopsy was not obtained.

Comment. The chest lesions in this patient appeared to be of long standing. Yet there were no symptoms referable to the pulmonary disease. Because of the negative tuberculin and positive histoplasmin skin reactions, complement fixation tests were run with suspicious results at first, and positive findings later. Gastric and sputum cultures were positive for *H. capsulatum*, and tubercle bacilli were absent, so that the diagnosis of histoplasmosis appears confirmed. In this case, however, histoplasmosis appeared as a complicating factor, rather than the cause of symptoms or death.

Severe Clinical Illness with Death Due to Other Causes

CASE 16. E. R., white male, 32 years old. Patient was employed as an engineer and had travelled about the country extensively. He had lived in Iowa for 18 years and, for 9 years prior to admission, in a small city in central Kansas. He was studied because he had had a diagnosis of torulosis (cryptococcosis) which had been made at another hospital.

History. The patient's symptoms were chills, fever, weight loss, draining left supraclavicular lymph nodes, and arthritis. His illness had begun 1½ years before admission when he had developed painful, swollen, raised areas on his shins; these had disappeared after penicillin therapy. Three months later, painful migratory swellings of the knees and ankles had appeared and these had been relieved by gold therapy. Thirteen months before admission, the arthritis had recurred without relief by further gold therapy. Five months later an evening temperature rise of 3° had been noted, with weight loss, malaise, irregular chills, and sweats. Fever had persisted, and 6 months before admission the patient had been studied by a clinic where a diagnosis of rheumatic fever was made. Bed rest with salicylates was advised. One month later cyanosis of the left arm developed, which was diagnosed as thrombophlebitis. This was accompanied by fever (up to 103°) which persisted in spite of sulfa drugs, streptomycin and penicillin. The cyanosis disappeared, but the fever persisted and a firm, nontender left cervical lymph node was noted in December 1947. A diagnosis of Hodgkins' disease was made, and the patient entered the Mayo Clinic. Here, the tuberculin test was negative, but biopsy of the enlarged cervical node was reported as suspicious of tuberculosis. An atypical acid-fast organism was isolated repeatedly from the sputum, but it was nonpathogenic for animals. *Torula* (cryptococci) were repeatedly isolated from the patient's sputum. Multiple infiltrations were noted in the lungs, and review of the older X-ray films revealed that the same infiltration had been present at least 3 months earlier. The white blood count varied from 14,000 to 25,000 per cu. mm. with predominance of polymorphonuclear leukocytes. The patient was transferred with the tentative diagnosis of tuberculosis and torulosis.

Admission findings. February 25, 1948. The patient was well developed but poorly nourished, and looked both acutely and chronically ill. He had a respiratory rate of 28 per minute, a draining sinus in the left supraclavicular region, and rheumatoid deformities of his fingers. Blood pressure was 100/70, and pulse 100. Red blood count was 4,100,000 per cu. mm with 64 percent hemoglobin; white blood count was 22,000 with 91 percent polymorphonuclear leukocytes, 8 lymphocytes, and 1 monocyte. Urine showed a faint trace of albumin and 3 to 4 white cells per high power field. Blood chemistry was within normal limits. X-rays showed multiple poorly circumscribed infiltrations scattered throughout both lung fields (fig. 19).

Skin tests. Tuberculin and histoplasmin tests were positive on admission, while a blastomycin test was doubtful and coccidioidin, negative. Three repeat tests showed essentially the same results except that blastomycin tests were negative in three applications. One trichinosis skin test was negative.

Complement fixation tests. Serum gave a positive (++++) complement fixation twice during the first week, and three additional times during the first month. The same findings were observed for 5 months. The reaction fell to suspicious (+++) during the 7th month and continued so through the 10th month. Eleven subsequent sera were negative or at most doubtful (++) until death, with the exception of one positive (++++) recorded 2 months before death.

Mycology and bacteriology. Thirteen sputa, seven gastric specimens, two blood cultures, three cultures from the neck or psoas abscesses and one urine were negative for acid-fast organisms by culture although several colonies of atypical acid-fast organisms were found. These are apparently nonpathogenic in guinea pigs. Four guinea pigs inoculated with these specimens were negative. Nineteen sputa, 11 gastric specimens, 4 specimens from neck or psoas abscesses, 4 blood samples, and 1 urine were negative for *H. capsulatum* on culture, with the exception of 1 positive sputum. Twenty-one mice inoculated with these materials were negative on autopsy, and organs were also negative on culture. In addition, 25 stool cultures were negative. At autopsy, cultures were made from the spleen, liver, lung, kidney, psoas abscess, and periaortic node, but all were negative for tuberculosis and fungi. Eight mice were inoculated with pooled tissue and were negative. Three guinea pigs were also inoculated and were negative at autopsy, except for an atypical acid-fast organism isolated from one pig.

Course. During the first 8 months of hospitalization, the patient had a daily temperature of 100° to 102°; during the next 5 months, temperatures fell gradually and rarely exceeded 99° during the later months. Patient remained essentially afebrile for the next 6 months, except for one period of 8 days during which the temperature exceeded 99°, reaching 102° on one day. During all this period, there was no change in the chest X-ray picture. The patient had a persistent leukocytosis ranging from 17,000 to 25,000 white blood cells per cu. mm. with the polymorphonuclear leukocytes ranging from 82 to 97 percent. An increase in the eosinophils was also found, and at one time these reached 15 percent.

Because of the persistent leukocytosis, careful X-ray studies were performed, revealing a psoas abscess on the left on August 1, 1949. Urea clearance and PSP showed only about 50 percent normal function. On August 10, the psoas abscess was explored and 300 cc. of pus evacuated. Following surgery, the patient gradually developed urinary failure and died on October 12, 1949 of urinary retention with a blood-NPN of over 130. Chest X-rays taken during the last month of life (September 21, 1949) revealed marked increase in the amount of infiltration, possibly more dense on the right, with coalescence of some lesions (fig. 20).

Autopsy findings. Acute glomerulonephritis with ascending suppurative pyelonephritis, superimposed on diffuse granulomatosis involving lungs, liver, kidneys, psoas muscles, spleen, lymph nodes, and myocardium. Extensive periarteritis was also found, especially of the pancreas, leading to the diagnosis of periarteritis nodosa. The granuloma resembled Hodgkins' type in some places, while in others it suggested mycotic granuloma, but was not typical of tuberculosis. No acid-fast or other type organisms were seen.

Comment. This case still remains a diagnostic problem as the pathological changes found on autopsy were not typical of any one specific disease. It is known that granulomatous disease may be caused by various types of fungi, among other things, and it is possible that in this case the atypical acid-fast organism which was repeatedly isolated may have had an etiologic relationship to the lesions found. Since periarteritis nodosa and Hodgkins' disease still pose etiologic problems, the multiple diagnosis made at autopsy suggests some interesting speculations concerning the possible relationship between all these granulomas, including those shown to be mycotic in origin. The single sputum culture found to be positive for *H. capsulatum* certainly does not serve to explain the entire disease picture. However, the role which this fungus may have played in the over-all picture of diffuse granuloma remains obscure.

Discussion and Summary

The present paper reports on six new patients from whom *H. capsulatum* was recovered and adds material on the ten previously reported from the Kansas City area. Two of the six newly reported patients have recovered; one is still ill, and three are dead.

All of the six new patients showed negative skin reactions to blastomycin and four of them were negative to coccidioidin. (Cases 11 and 15 were not tested.) Three of the six showed disseminated lesions on chest X-rays: one (case 11) healed with the development of miliary calcification; the second (case 12) healed with disappearance of the lesions; and in the third (case 16) the lesions persisted unchanged for 2 years before the patient died of causes other than histoplasmosis.

No cases of coexistent tuberculosis and histoplasmosis were found among these six new patients although two were found in the original ten cases. Two of the six had laryngeal histoplasmosis. One of the six was diagnosed as having preexisting torulosis (cryptococcosis) and died of periarteritis nodosa and multiple granuloma of undetermined etiology.

Clinical and Laboratory

Case	First observed	Skin tests			Complement fixation		Mycology and bacteriology	
		Date	Histo	Tbcln			Date	Specimen
1. Male 13 years........	2- 5-45	2- 5-45	....	neg.	8-18-47	neg.	11-23-45	gast.
		6- 7-45	pos.	......	9-15-17	pos.	11-24-45	gast.
		11-26-45	pos.	neg.	9-17-47	pos.	11-25-45	gast.
		1- 4-46	pos.	neg.	6-10-48 to 12-9-49	5 susp.	11-23-45 to 11-25-45	gast.
		6- 4-46	pos.	neg.				
		10- 4-48	pos.	neg.				
							1- 9-46 to 5- 7-46	17 gast.
2. Male 5 months........	3- 1-47	3- 2-47	neg.	neg.	6-30-47	pos.	3-18-47	blood.
		4-16-47	pos.	neg.	7-10-47	pos.	3-21-47	blood.
		5- 7-47	pos	neg.	8-15-47	pos.	3-21-47	marrow
		7-26-47	pos.	neg.	9-29-47	susp.	4- 8-47 to 8-19-47	8 blood.
		9- 8-47	pos.	neg.	10-27-47	pos.		
		11- 5-48	pos.	neg.	11-10-47	pos.		
					2-18-48	susp.		
					5-20-48	pos.		
					6-27-49	susp.		
					1-16-50	neg.		
3. Female 20 months.....	3-23-47	3-24-47	neg.	neg.	9- 4-47	susp.	8-19-47	spleen.
		8-25-47	pos.	neg.	9-11-47	pos.	8-19-47	spleen.
		9- 2-47	pos.	....	10-13-47	pos.	9- 2-47	gast.
		8-16-49	pos.	neg.	12- 4-47	pos.	9-2, 3, 5-47	
					10-18-48	neg.	....	2 gast.
					8-16-49	neg.	9-3, 5-47	2 gast.
					2-18-50	neg.		

*Cases 1 to 10 from Pub. Health Rep. 63: 315 (1948), reference No. 4. Cases 11 to 16 are reported in this paper.

The accompanying table presents pertinent clinical and laboratory data on all 16 cases. This case material shows variations in diagnostic certainty ranging from the clear-cut, uncomplicated cases of clinical histoplasmosis, through the probable cases, to those in which the finding of *Histoplasma* was incidental to the diagnosis of another disease. Emphasis should perhaps be placed on the observation that the fungus may be found to be present in a wide variety of clinical conditions. Whether it may play a decisive role as the etiologic agent must be carefully considered in the light of all available evidence pertaining to the disease process. And, perhaps most important of all, one must not only think of histoplasmosis in the differential diagnosis of a granulomatous or infective disease, but painstaking search for the organism must frequently be made in order to establish the correct diagnosis.

Of the 16 cases studied, 5 have recovered. Two other cases are classed as still ill. The fact that almost one-third of cases in our series recovered supports the original concept of Palmer (*1*) and Christie and Peterson (*2*) of the occurrence of nonfatal histoplasmosis. This concept is further supported by the reports of nine other proved recovered cases in the literature (*5–12*).

Findings for 16 Patients[*]

Mycology and bacteriology—Continued			Chest X-ray	Status	Additional findings
Test	H. c.	T. b.			
cult.	pos.	neg.	miliary infiltrations 4–10–45. Miliary calcifications 12–9–49.	Living and well 3–23–50.	Recovery uneventful.
cult.	neg.	neg.			
cult.	neg.	neg.			
g. pig.	pos.	neg.			
17 cult.	neg.				
cult.	neg.	- - -	Normal 3–15–47. Normal 1–16–50.	Living and well 1–16–50.	3–2–47 typhoid, paratyphoid A and B, brucellosis agglutinations all negative.
cult.	pos.	- -- ---			
cult.	pos.	---------			
8 cult.	8 neg.	---- ----			
cult.	pos.	neg.	Infiltration in right lower lobe 7–5–47. Calcification in right lower lobe and hilar node 2–18–50.	Living and well 2–18–50.	8–19–47 surgical specimens of spleen, liver and abdominal lymph node showed multiple granulomatous lesions. H. c. not identified on microscopic sections.
mouse.	pos.				
cult.	pos.	neg.			
3 mice.	neg.				
2 cult.	2 neg.	2 neg.			

[*] Cases 1 to 10 from Pub. Health Rep. 63: 315 (1948), reference No. 4. Cases 11 to 16 are reported in this paper.

Case	First observed	Skin tests			Complement fixation		Mycology and bacteriology	
		Date	Histo	Tbcln			Date	Specimen
4. Male 52 years	10-26-47	10-27-47 1- 5-48 10-26-48	pos. pos. pos.	neg. pos. pos.	10- 8-47 10-23-47 10-28-47 1- 5-48 to 10- 6-49	pos. pos. pos. 10 pos.	10-27-47 10-27-47 10-27-47 10-28-47 10-29-47 10-29-47 12-31-47	spt. gast. biopsy. gast. spt. bronch. spt.
5. Male 64 years	12- 5-47	12- 6-47 12-17-47 1- 5-48 12- 8-48 12-13-48 4-19-49	pos. pos. pos. pos. pos pos.	------- pos. pos. pos. pos. neg.	12- 6-47 12-19-47 1- 5-48 to 5- 1-49 ----------	pos. pos. 6 pos. ----------	12-11-47 to 4-21-49 ---------- ----------	25 spt. 5 gast. 3 gast. 1 stool. 9 spt. 3 blood. 7 spt. 2 spt.
6. Male 22 years	6-13-47	6-17-47 7- 8-47 7-22-47 8-12-47 9- 3-47	pos. pos. pos. pos. pos.	pos. pos. pos. ------- pos.	7- 5-47 7- 9-47 7-22-47 8-12-47 9- 3-47	neg. pos. doubt. doubt. neg.	7- 8-47 8-14-47 8-15-47 9- 3-47	spt. spt. spt. blood.
Male 48 years	5-20-47	5-26-47 7- 2-47 7- 9-47 7-17-47 7-29-47	neg. pos. pos. pos. pos.	neg. neg. ------- ------- -------	7- 1-47 7- 2-47 7- 8-47 7-16-47	pos. pos. neg. pos.	5-27-47 5-28-47 5-29-47 7- 2-47	gast. gast. gast. spleen.
8. Female 53 years	7-14-47	8- 8-47 8-20-47 9- 8-47 9-22-47	neg. neg. neg. neg.	neg. neg. neg. neg.	8- 8-47	neg.	8- 8-47 8-11-47 8-12-47 8-20-47	blood. marrow. bronch. marrow. node. node.
9. Female 6 months	10-21-47	10-30-47	neg.	neg.	10-27-47 11- 3-47	susp. susp.	10-30-47 10-31-47 10-31-47 10-31-47	blood. blood. marrow. marrow.
10. Male 37 years	10-21-47	11- 5-47	neg.	neg.	11- 5-47	pos.	----------	----------

*Cases 1 to 10 from Pub. Health Rep. 63: 315 (1949), reference No. 4. Cases 11 to 16 are reported in this paper.

*Findings for 16 Patients**—Continued

Mycology and bacteriology—Continued			Chest X-ray	Status	Additional findings
Test	H. c.	T. b.			
cult.	pos.	----------	Infiltration of entire left and upper right lobes, 10–23–47. Cavities in upper left and upper right lobes 8–8–49.	Slowly progressive disease 4–12–50.	13 sputum specimens cultured 1–15–48 to 12–6–48: 8 positive and 4 negative for H. c., 8 negative for T. b. Animal inoculations of 3 divided specimens: 2 of 7 mice and 1 of 7 rats positive for H. c.; 3 guinea pigs negative for T. b.
cult.	neg.	neg.			
cult.	neg.	neg.			
cult.	neg.	neg.			
cult.	pos.	neg.			
cult.	neg.	neg.			
cult.	pos.	neg.			
2 g. pigs	----------	neg.			
2 mice	pos.	----------			
40 cult.	13 pos. 7 neg.	20 neg.	Infiltration in right upper lobe, 6–10–43. Cavities in right lung; fibrosis and calcification in left lung 11–23–48.	Died 5–1–49.	Sections of lung, spleen and adrenals morphologically positive for H. c. Pooled organ cultures, rat and guinea pig inoculations negative for H. c. and T. b. Spleen culture positive, rat inoculation for H. c. negative. Cultures and animal inoculations from lung and adrenals all negative for H. c. and T. b.
7 cult.	1 pos. 2 neg.	4 neg.			
6 mice.	1 pos. 5 neg.	----------			
cult.	1 neg.	----------			
10 mice.	4 pos. 6 neg.	----------			
3 cult.	neg.	----------			
4 g. pigs.	----------	4 neg.			
6 rats.	6 pos.	----------			
cult.	neg.	neg.	Increased markings right lower lung 6–14–47.	Died 9–10–47.	Autopsy diagnosis: pulmonary histoplasmosis, chronic pneumonia and chronic nephritis. H. c. identified in lung sections. Pooled organ cultures negative for H. c. and T. b.; 2 guinea pigs positive for T. b., 1 of 3 mice positive for H. c.
cult.	neg.	neg.			
cult.	neg.	neg.			
cult.	neg.	neg.			
cult.	neg.	neg.	Infiltrations in right and left lungs with cavity in the left, 3–15–45. New infiltration in right mid-lung field 6–13–47.	Died 9–8–47.	Autopsy: Pooled organ culture positive for H. c.; lung culture and guinea pig positive for both H. c. and T. b.; adrenal culture contaminated; guinea pig positive for both H. c. and T. b.
g. pig.	neg.	neg.			
cult.	neg.	neg.			
g. pig.	neg.	neg.			
cult.	pos.	neg.			
g. pig.	neg.	neg.			
cult.	pos.	----------			
section.	pos	----------			
cult.	neg.	----------	Infiltration and fibrosis in both upper lung fields 7–22–47.	Died 10–12–47.	Autopsy diagnoses: Hodgkins disease and histoplasmosis. Pooled organ cultures positive for H. c., negative for T. b.; liver and spleen pooled culture positive for H. c.: lung and lymph node pooled culture negative for H. c. and negative for T. b. Liver and adrenal sections positive morphologically for H. c.
cult.	neg.	----------			
cult.	neg.	----------			
cult.	neg.	----------			
cult.	neg.	----------			
section.	neg.	----------			
cult.	pos.	----------	Infiltration in right lower lobe 10–21–47.	Died 11–3–47.	Autopsy diagnosis: histoplasmosis. Pooled organ culture, 2 of 4 mice and 1 of 3 guinea pigs positive for H. c.; all 3 negative for T. b. Spleen, blood, marrow smears, blood culture and tissue section of organs positive for H. c.
cult.	pos.	----------			
smear.	pos.	----------			
cult.	pos.	----------			
----------	----------	----------	Diffuse granular infiltrations 11–3–47.	Died 11–7–47.	Autopsy diagnosis: generalized histoplasmosis. Tissue sections of lung, liver, spleen, lymph node positive for H.c.

*Cases 1 to 10 from Pub. Health Rep. **63**: 315 (1948), reference No. 4. Cases 11 to 16 are reported in this paper.

Case	First observed	Skin tests			Complement fixation		Mycology and bacteriology	
		Date	Histo	Tbcln			Date	Specimen
11. Male 4 years	9–11–46	8–25–46	doubt.	neg.	8–12 47	pos.	9–12–46	blood.
		9–11–46	pos.	neg.	1–21–48	pos.	9–12–46	gast.
		10–17–46	pos.	neg.	4– 7–48	pos.	9–13–46	marrow.
		12– 3–46	pos.	neg.	11–16–48	pos.	9–13–46 to 9–17–46	5 gast.
		4–22–47	pos.	neg.	4–29–49	pos.	9–16–46	blood.
		8–12–47	pos.	neg.	12–28–49	susp.	10–17–46 to 10–19–46	4 gast.
							1–29–48	tonsil.
12. Female 41 years	4– 1–49	4–16–49	pos.	pos.	4– 7–49	pos.	4– 2–49	spt.
		5–16–49	pos.	pos.	4–19–49	pos.	4– 7–49	spt.
					5–17–49	susp.	5–17–49	spt.
					6–29–49	susp.	5–19–49	spt.
					7–15–49	susp.		
					9–21–49	pos.		
					2–12–50	susp.		
13. Male 64 years	9– 6–49	11–14–49	pos.	neg.	11–17–49 to 12–28–49	5 pos.	11– 9–49 to 12–28–49	16 spt.
		12– 7–49	pos.	neg.	12–30–49 to 2– 6–50	4 susp.	12–28–49	spt.
		1–19–50	pos.	neg.	2–10–50	pos.		
					2–13–50	pos.		
					2–15–50	susp.		
					2–17–50	susp.		
					2–27–50	pos.		
14. Male 69 years.	12–13–49	11–13–49	pos.	neg.	11–16–49	pos.	12–14–49 to 12–23–49	22 spt.
		12–13–49	pos.	neg.	12–13–49	pos.	12–16–49	3 spt.
					12–16–49	pos.		
					12–18–49	pos.		
					12–20–49	pos.		
15. Male 61 years.	10–10–47	10–29 47	pos.	neg.	10–30–47	susp.	10–29–47 to 11–18–48	5 gast. 2 gast.
		11– 4–47	pos.	neg .	11–10–47	susp.	11–26–47	blood.
		3–22–48	pos.	neg.	3–22–48	susp.	12–10–47	gast.
		5–10–48	pos.	neg.	6–23–48	pos.	4– 5–48	gast.
					9–23–48	pos.	4– 6–48	gast.
					11– 5–48	pos.	4– 7–48	gast.
								spt.
16. Male 32 years.	2–25–48	2–28–48	--------	pos.	3– 1–48 to 8–13–48	8 pos.	3– 3–48 to 9–29–49	18 spt.
		3– 1–48	pos.	pos.	10–25–48 to 1–24–49	3 susp.	3–23–48 to 9–29–49	6 blood.
		10–26–48	pos.	pos.	2–16–49 to 7–14–49	7 neg. 3 susp.	4–23–48	spt.
		5–25–49	pos.	pos.	8–11–49	pos.	3–31–48 to 8–18–48	11 gast.
		9–26–49	doubt.	pos.	9–26–49	neg.		

*Cases 1 to 10 from Pub. Health Rep. 63: 315 (1948), reference No. 4. Cases 11 to 16 are reported in this paper.

*Findings for 16 Patients**—Continued

Mycology and bacteriology—Continued			Chest X-ray	Status	Additional findings
Test	H. c.	T. b.			
cult.	neg.	----------	Miliary infiltration 9-3-46. Miliary calcification 12-28-49.	Living and well 12-28-49.	Tonsil sections showed granuloma but H.c. not identified in sections.
cult.	neg.	neg.			
cult.	neg.	----------			
{10 cult.	5 neg.	neg.			
{1 hamst.	----------	5 neg.			
cult.	neg.	----------			
4 cult.	neg.	----------			
{1 cult.	pos.	----------			
{4 mice.	neg.	neg.			
cult.	----------	neg.	Scattered infiltrations bilaterally 4-1-49. Clear chest 12-8-49.	Living and well 3-3-50.	Tuleremia, typhoid, and brucellosis agglutinations negative 3-25-49 and 4-12-49. Migratory allergic arthritis 4-20-49 and generalized rash 4-27-49, probably drug sensitivity.
cult.	pos.	----------			
cult.	neg.	----------			
cult.	neg.	----------			
{19 cult.	{9 pos.	4 neg.	Infiltration in left lower lobe 9-6-49. Marked clearing in left lower lobe 1-31-50.	Discharged improved from hospital 3-9-50; still improving when last seen on 4-11-50.	Laryngeal biopsies 9-26-49, 11-3-49 and 1-4-50: acute and chronic granulation tissue with H.c. in mononuclear and giant cells.
	{6 neg.	----------			
{15 mice.	{5 pos.	----------			
	{10 neg.	----------			
g. pig.	----------	neg.			
{28 cult.	{20 pos.	}6 neg.	Generalized bilateral granularity 11-10-49. Granularity in right upper lobe 12-13-49.	Died 12-27-49.	Laryngeal biopsy 11-18-49: positive histologically for H. c. Autopsy diagnosis: generalized histoplasmosis, chronic femoral phlebitis with terminal pulmonary embolus. Lung, blood, brain, adrenal, liver, heart, spleen and larynx cultures positive for H. c.; pooled organ inoculation of 2 mice positive for H. c.; 2 cultures and 2 guinea pigs negative for T. b.
	{2 neg.				
{6 mice.	{4 pos.	----------			
	{2 neg.	----------			
g. pig.	----------	neg.			
8 cult.	3 neg.	5 neg.	Infiltration in right upper lobe with cavity 11-13-47. No change on film of 6-22-48.	Died 11-16-48.	No autopsy. Death due to "heart attack."
4 mice.	4 neg.	----------			
cult.	neg.	----------			
{2 mice.	neg.	----------			
{cult.	neg.	----------			
{cult.	pos.	----------			
{2 mice.	neg.	----------			
cult.	pos.	----------			
cult.	pos.	----------			
cult.	pos.	----------			
{31 cult.	18 neg.	13 neg.	Scattered soft infiltrates 3-3-48. Disseminated and coalescent infiltrates 9-21-49	Died 10-12-49.	Atypical acid-fast organisms cultured from sputum 3-10-48, from an abscess 8-6-48 and from 1 of 3 guinea pigs inoculated with pooled autopsy organs. Autopsy diagnosis: periarteritis nodosum and granulomatosis of unknown etiology. Cultures and animal inoculations of autopsy tissues all negative for H. c. and T. b.
{6 mice.	6 neg.	----------			
6 cult.	neg.	----------			
cult.	pos.	----------			
11 cult.	11 neg.	7 neg.			
11 mice.	11 neg.	----------			
3 g. pigs.	----------	3 neg.			

*Cases 1 to 10 from Pub. Health Rep. 63:315 (1948), reference No. 4. Cases 11 to 16 are reported in this paper.

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Incidence of Disease

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

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UNITED STATES

Reports From States for Week Ended July 15, 1950

New cases of acute poliomyelitis reported in the Nation for the current week numbered 665, an increase over the 478 cases reported for the preceding week. However, the number was lower than the 1,014 cases reported for the corresponding period last year. The cumulative total (3,194) for the current "disease" year was below the corresponding total of 3,968 for last year, the highest year on record. The "disease" year for acute poliomyelitis begins with the twelfth week of the calendar year.

For the current week, all geographic divisions showed increases over the preceding week. These increases ranged from 4 cases reported in the Mountain States to 34 cases each in the East North

Comparative Data for Cases of Specified Reportable Diseases: United States

[Numbers after diseases are International List numbers, 1948 revision]

Disease	Total for week ended—		5-year median 1945–49	Seasonal low week	Cumulative total since seasonal low week		5-year median 1944–45 through 1948–49	Cumulative total for calendar year		5-year median 1945–49
	July 15, 1950	July 16, 1949			1949–50	1948–49		1950	1949	
Anthrax (062)	1	------	(1)	(1)	(1)	(1)	(1)	26	23	(1)
Diphtheria (055)	60	84	138	27th	60	84	138	3,188	3,852	6,435
Acute infectious encephalitis (082)	17	10	10	(1)	(1)	(1)	(1)	398	289	248
Influenza (480–483)	526	401	584	30th	275,757	111,383	181,080	245,227	75,113	137,522
Measles (085)	5,164	4,317	4,317	35th	[2] 295,664	631,323	569,415	[2] 276,534	578,930	533,201
Meningococcal meningitis (057.0)	56	51	63	37th	3,314	2,941	3,195	2,401	2,097	2,223
Pneumonia (490–493)	888	808	------	(1)	(1)	(1)	--------	57,110	51,759	------
Acute poliomyelitis (080)	665	1,014	427	11th	3,194	3,968	2,123	4,328	4,883	2,590
Rocky Mountain spotted fever (104)	23	17	28	(1)	(1)	(1)	(1)	[2] 215	275	220
Scarlet fever (050)	333	309	604	32d	55,502	79,279	86,862	39,063	56,735	60,176
Smallpox (084)	------	------	1	35th	43	49	195	23	39	141
Tularemia (059)	16	17	28	(1)	(1)	(1)	(1)	546	676	568
Typhoid and paratyphoid fever (040, 041) [3]	88	106	106	11th	1,086	1,087	1,187	1,596	1,575	1,660
Whooping cough (056)	2,363	1,402	2,176	39th	[4] 95,638	40,201	83,683	[4] 74,102	30,168	53,039

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[1] Not computed.

[2] Indiana: Addition—measles, week ended May 27, 1 case; deduction—Rocky Mountain spotted fever, week ended May 27, 1 case.

[3] Including cases reported as salmonellosis.

[4] Tennessee: Addition—whooping cough, week ended July 8, 30 cases.

Central and the South Atlantic States. Texas reported the largest number of cases (124); New York, the second highest (44); and California, the third (39).

The total number of cases of influenza reported for the current week was 526, compared with 401 for the corresponding period last year. The cumulative total for the "disease" year (beginning with the thirty-first week, 1949) was 275,757 reported cases of influenza. The 5-year median was 181,080.

The number of cases of acute infectious encephalitis reported for the week was 17, an increase from the 15 cases reported for the preceding week. For the corresponding week last year 10 cases were reported. The cumulative total for the current calendar year was 398 which may be compared with the corresponding figure of 289 for 1949 and 248 for the 5-year median.

The total number of cases of Rocky Mountain spotted fever reported in the Nation for the current week was 23 compared with 24 cases last week and 17 cases for the corresponding week last year. The cumulative total for the calendar year to date was 215 compared with 275 cases reported for the corresponding period last year and 220 cases, the 5-year median.

The total number of cases of diptheria reported for the current week was 60, the lowest total for the corresponding week in the past 5 years. The cumulative total for the current calendar year is 3,188 cases, the lowest number reported during the past 5 years. The 5-year low in reported cases of diphtheria is also shown by figures for the "disease" year which ended with the twenty-seventh week.

One case of anthrax was reported in Colorado. No cases of smallpox were reported in the United States.

Deaths During Week Ended July 15, 1950

	Week ended July 15, 1950	*Corresponding week, 1949*
Data for 94 large cities of the United States:		
Total deaths	8, 576	8, 320
Median for 3 prior years	8, 320	----------
Total deaths, first 28 weeks of year	266, 026	264, 454
Deaths under 1 year of age	629	617
Median for 3 prior years	640	----------
Deaths under 1 year of age, first 28 weeks of year	17, 416	18, 165
Data from industrial insurance companies:		
Policies in force	70, 159, 257	70, 325, 670
Number of death claims	11, 972	12, 698
Death claims per 1,000 policies in force, annual rate	8. 9	9. 4
Death claims per 1,000 policies, first 28 weeks of year, annual rate	9. 6	9. 4

Reported Cases of Selected Communicable Diseases: United States, Week Ended July 15, 1950

[Numbers under diseases are International List numbers, 1948 revision]

Area	Diphtheria (055)	Encephalitis, infectious (082)	Influenza (480–483)	Measles (085)	Meningitis, meningococcal (057.0)	Pneumonia (490–493)	Poliomyelitis (080)
United States	**60**	**17**	**526**	**5, 164**	**56**	**888**	**665**
New England	**4**	**2**		**519**	**2**	**38**	**16**
Maine	1			3		17	2
New Hampshire				3			1
Vermont		1		1			
Massachusetts	3	1		363	2		3
Rhode Island				2		8	1
Connecticut				147		13	9
Middle Atlantic	**13**	**3**		**1, 959**	**13**	**238**	**78**
New York	9	3	(1)	826	8	157	44
New Jersey				741	2	32	20
Pennsylvania	4			392	3	49	14
East North Central	**4**	**8**	**12**	**1, 420**	**7**	**132**	**74**
Ohio		1	6	346		12	15
Indiana	2	1		49		5	5
Illinois	1	5	2	376	5	83	27
Michigan	1	1		178	1	29	19
Wisconsin			4	471	1	3	8
West North Central	**4**	**2**	**7**	**145**	**4**	**149**	**69**
Minnesota				61	1	8	8
Iowa				7	2		32
Missouri	2		4	33	1	6	12
North Dakota		1		23		127	
South Dakota		1		5			1
Nebraska			3			1	14
Kansas	2			16		7	2
South Atlantic	**7**		**117**	**143**	**5**	**76**	**118**
Delaware				8			
Maryland			5	23	1	21	3
District of Columbia				7	2	4	6
Virginia	1		84	58	1	32	32
West Virginia				11		1	8
North Carolina	4			11			20
South Carolina			21	4		4	28
Georgia	1		7	2		11	12
Florida	1			19	1	3	9
East South Central	**5**		**15**	**69**	**7**	**35**	**74**
Kentucky	2			18		1	23
Tennessee	1		11	10	2		26
Alabama	2		4	26	1	21	14
Mississippi				15	4	13	11
West South Central	**18**	**2**	**332**	**198**	**12**	**168**	**172**
Arkansas	1		30	19	4	4	10
Louisiana	1			3	1	10	12
Oklahoma	1	1	8	8	1	10	26
Texas	15	1	294	168	6	144	124
Mountain	**1**		**37**	**283**	**2**	**20**	**11**
Montana	1		2	4			1
Idaho			3	30	1		
Wyoming				8			
Colorado			6	135		6	4
New Mexico			2	8	1	3	1
Arizona			24	10		5	4
Utah				88		6	1
Nevada							
Pacific	**4**		**6**	**428**	**4**	**32**	**53**
Washington	1			40	1		10
Oregon			1	4		6	4
California	3		5	384	3	26	39
Alaska			2				
Hawaii				1			

[1] New York City only. *Anthrax:* Colorado, 1 case.

Reported Cases of Selected Communicable Diseases: United States, Week Ended July 15, 1950—Continued

[Numbers under diseases are International List numbers, 1948 revision]

Area	Rocky Mountain spotted fever (104)	Scarlet fever (050)	Small-pox (084)	Tularemia (059)	Typhoid and paratyphoid fever [1] (040, 041)	Whooping cough (056)	Rabies in animals
United States	**23**	**333**		**16**	**88**	**2,363**	**152**
New England		**51**			**1**	**238**	
Maine		2				51	
New Hampshire		1					
Vermont		2				23	
Massachusetts		39			1	74	
Rhode Island		3				27	
Connecticut		4				63	
Middle Atlantic	**2**	**65**			**5**	**313**	**37**
New York		[2] 42			5	102	33
New Jersey		6				104	
Pennsylvania	2	17				107	4
East North Central	**3**	**70**		**1**	**11**	**579**	**24**
Ohio		34			7	126	5
Indiana		5				28	8
Illinois	3	9		1	3	111	1
Michigan		15			1	159	9
Wisconsin		7				155	1
West North Central		**20**		**1**	**2**	**95**	**11**
Minnesota		3				19	
Iowa		2				12	2
Missouri		7		1	1	35	
North Dakota		8					
South Dakota							
Nebraska						3	
Kansas					1	26	9
South Atlantic	**12**	**26**		**2**	**13**	**302**	**25**
Delaware						3	
Maryland	2	3		1	2	33	
District of Columbia		1			1	9	
Virginia	2	4			2	102	1
West Virginia	1	1			1	39	7
North Carolina	4	16			1	68	
South Carolina	2				3	17	7
Georgia	1	1		1	2	19	10
Florida					1	12	
East South Central	**1**	**22**		**1**	**11**	**83**	**25**
Kentucky	1	3			5	6	16
Tennessee		9			3	43	2
Alabama		7			3	26	7
Mississippi		3		1		8	
West South Central	**2**	**17**		**7**	**31**	**427**	**26**
Arkansas	2	1		6	2	30	
Louisiana		2			2	2	
Oklahoma		2			7	33	6
Texas		12		1	20	362	20
Mountain	**3**	**13**		**4**	**5**	**139**	**2**
Montana	2					8	
Idaho		2				21	
Wyoming						8	
Colorado	1	3		1	1	26	
New Mexico					3	20	2
Arizona		8			1	31	
Utah				3		9	
Nevada						16	
Pacific		**49**			**9**	**187**	**2**
Washington		2				46	
Oregon						49	
California		47			9	92	2
Alaska						3	
Hawaii							

[1] Including cases reported as salmonellosis. [2] Including cases reported as streptococcal sore throat.

FOREIGN REPORTS

ANGLO-EGYPTIAN SUDAN

Meningitis, meningococcal. The approximate number of cases of meningococcal meningitis during the outbreak which occurred in Anglo-Egyptian Sudan January–May 1950, was 5,245. The highest incidence was reported in Darfur Province, where 3,840 cases were recorded. Khartoum Province reported 554 cases, and Kordofan Province, 310.

EGYPT

Meningitis, meningococcal. During the epidemic of meningococcal meningitis which began in Egypt the latter part of 1949, the peak incidence (214 cases) was reported for the week ended March 18, 1950. The total number of cases reported January 1–May 27 was 1,745. This was stated to be the first time meningococcal meningitis has been reported in epidemic proportions in Egypt since the years 1931–34. The reported incidence for those years was 871, 4,508, 1,603, and 626 cases, respectively.

CUBA

Reported Cases of Certain Diseases—4 Weeks Ended May 27, 1950

Disease	Pinar del Rio	Habana		Matanzas	Santa Clara	Camaguey	Oriente	Total
		Habana City	Total					
Cancer	5		20	8	22	4	18	77
Chickenpox	1	26	29	2	4	15	11	62
Diphtheria		9	15	3				18
Leprosy	1		4		1			6
Malaria		1	1			1	19	21
Measles		4	5			7	12	24
Poliomyelitis					1			1
Tuberculosis	1		8	8	18	15	14	64
Typhoid fever	3	4	7	5	1	7	18	41
Whooping cough			5			1		6

FINLAND

Reported Cases of Certain Diseases—May 1950

Disease	Cases	Disease	Cases
Diphtheria	46	Scarlet fever	849
Dysentery	61	Typhoid fever	15
Meningitis, meningococcal	9	Venereal diseases:	
Paratyphoid fever	72	Gonorrhea	524
Poliomyelitis	17	Syphilis	32

MADAGASCAR

Reported Cases of Certain Diseases and Deaths—May 1950

Disease	Aliens		Natives	
	Cases	Deaths	Cases	Deaths
Beriberi			2	
Bilharziasis			32	
Diphtheria			2	1
Dysentery, amebic	12		104	1
Erysipelas			6	
Influenza	141		3,181	34
Leprosy	2	1	24	
Malaria	234	2	33,841	136
Measles	2		31	
Meningitis, meningococcal			7	
Mumps	1		99	
Plague			3	3
Pneumonia (all forms)	4	2	615	123
Poliomyelitis			1	
Puerperal infection			3	
Scarlet fever			1	
Trachoma			3	
Tuberculosis, respiratory	6	3	75	17
Typhoid fever	2		9	2
Whooping cough	2		269	2

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

Burma. Cholera has been reported in Burma as follows: Week ended June 24, 1950, 36 cases, 18 deaths; week ended July 1, 45 cases, 27 deaths.

India. During the week ended July 1, 1950, 193 cases of cholera, with 69 deaths, were reported in Calcutta, and 15 cases (no deaths) in Delhi. One fatal case was reported in Lucknow during the week ended June 24.

Pakistan. For the week ended July 1, 1950, 14 cases of cholera, with 8 deaths, were reported in Chittagong.

Plague

Belgian Congo. On July 4, 1950, one fatal case of plague was reported at Indjoukwa (a village north of Blukwa), Stanleyville Province.

China. On July 7, 1950, 10 fatal cases of plague were reported in Amoy, Fukien Province.

Smallpox

Belgian Congo. During the week ended July 1, 1950, 134 cases of smallpox were reported in Belgian Congo.

British East Africa. During the week ended May 20, 1950, 98 cases of smallpox, with 21 deaths, were reported in Tanganyika Territory.

India. For the week ended June 24, 1950, 88 cases of smallpox, with 85 deaths, were reported in Calcutta, and 55 cases, 10 deaths, in Madrid; for the week ended July 1, 76 cases, 70 deaths were reported in Calcutta, and 54 cases, 11 deaths in Madrid.

India (Portuguese). During the week ended June 17, 1950, 16 cases of smallpox were reported in Portuguese India.

Indonesia. During the week ended June 10, 1950, 6 cases of smallpox were reported in Bandjermasin, Borneo, and for the week ended June 17, 11 cases were reported. For the week ended June 24, 194 cases, with 58 deaths, were reported in Surabaya, Java.

Rhodesia (Southern). During the month of May 1950, 55 cases of smallpox (10 deaths) were reported in Southern Rhodesia.

Typhus Fever

Belgian Congo. During the three weeks ended June 24, 1950, 24 cases of typhus fever (murine type) were reported in Belgian Congo, 11 of which were reported for the week ended June 10.

Yellow Fever

Cameroon (French). On July 6, 1950, one fatal suspected case of yellow fever was reported in Foumban Region, French Cameroon.

Colombia. During the month of January 1950, two deaths from yellow fever were reported in Colombia as follows: One death at Rio de Oro, Los Angeles, Magdalena Department, and one death at Putumayo Commissary, Mocoa.

Sierra Leone. During the period June 24–25, 1950, one fatal suspected case of yellow fever was reported in Koinadugu District.

Plague Infection on the Island of Hawaii

Under date of July 12, 1950, plague infection was reported proved on June 26, 1950, in a mass inoculation of 10 fleas, collected from rats trapped in District 9A, Paauhau, Hamakua District, Island of Hawaii.

Study of Laboratory Infection

The first comprehensive survey to be made in this country of the incidence of infection among laboratory and research workers is now being conducted with the assistance of a $3,200 grant from the Division of Research Grants and Fellowships of the National Institutes of Health, Public Health Service.

Dr. S. E. Sulkin and Dr. R. M. Pike of Southwestern Medical College, University of Texas, who are conducting the survey, will send questionnaires to all governmental and private laboratories handling infectious agents Some 3,000 questionnaires, requesting information on numbers and types of infections which have occurred in individual laboratories in the past 20 years, have already been sent out; another 12,000 will be sent in the next few months.

The demands of modern medicine require increased numbers of laboratory technicians to handle potent disease-producing agents, both in diagnostic work and in research. As a result significant increases in laboratory infections have occurred, according to reports received by the Public Health Service.

The purpose of the survey is to determine how serious the problem is. No one knows how many laboratory infections occur among scientists who are dealing with diseases such as tuberculosis, tularemia, epidemic typhus, encephalitis, and Q fever. A channel for reporting such infections has never been set up.

The National Advisory Health Council, at its June 1950 meeting, unanimously recommended that such a survey be made, after studying a request from a private laboratory for funds to set up safeguards for workers on a Public Health Service-financed project. The Council felt that information on useful protective measures should be made available to all laboratories through a group study of the problem.

Dr. Sulkin and Dr. Pike will present results of their survey to the American Public Health Association at its annual meeting in St. Louis, October 30 to November 3. APHA has arranged a special symposium on protective measures against laboratory-acquired infections and, in addition to the report of the survey, will hear discussions of laboratory infections in tuberculosis, brucellosis and tularemia, mycotic disease, viral and rickettsial diseases, and of general laboratory safeguards.

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The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

The Public Health Reports, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

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FEDERAL SECURITY AGENCY

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PUBLIC HEALTH SERVICE
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Division of Public Health Methods
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Public Health Reports

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The Physiological Response to Dust From Mine Locomotive Traction Material

By LAWRENCE T. FAIRHALL, Ph.D,* BENJAMIN HIGHMAN, M.D.† and VERNON B. PERONE*

Silicosis as an occupational disease among locomotive operators in mines has been attributed to the traction material in common use. This traction material, which in many cases is ordinary sand, is systematically distributed on the rails in order to afford sufficient traction for the locomotive. The spinning and grinding action of the wheels necessarily produces dust which, in the confined space of entries or tunnels, may rise to high atmospheric concentrations. In the case of sand, the free silica content of the atmospheric dust may be far in excess of the maximum amount permissible in dusty trades.

Various substances other than sand have been proposed for traction material (*1*). Some of these substances, however, are not sufficiently hard for the purpose, or have other physical characteristics, such as packing or the tendency to absorb moisture, which have limited their usefulness. Economic factors are obviously of importance also, as the tonnage of traction material required for ordinary operation is large. Among the substances which have been proposed or used are certain mine tailings and also various metallurgical slags.

A number of such substances [1] having the requisite hardness and availability were selected and injected intraperitoneally into guinea pigs, according to the method of Miller and Sayers (*2*, *3*, *4*), to determine from the character of the peritoneal reaction the likelihood of their producing pneumoconiosis in man. Miller and Sayers described an absorptive, a proliferative, and an inert type of reaction. Dusts of the absorptive group produce peritoneal nodules on the anterior abdominal wall which progressively decrease in size as the interval between injection and examination increases, while dusts causing a proliferative type of reaction produce nodules which progressively increase in size.

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[1] We are indebted to Dr. R. R. Sayers, Chairman, Medical Advisory Board, Welfare and Retirement Fund, United Mine Workers of America, and to J. J. Forbes, Chief, Health and Safety Division, Bureau of Mines, United States Department of Interior, for making available certain of the materials used and for analytical and X-ray diffraction study of these products.

The nodules produced by the inert group become flattened with irregular edges, but the amount of dust found in the peritoneal cavity 1 year after injection is essentially the same as that noted in 7 days. There was some evidence that silica mixed with an inert dust causes a modified proliferative reaction (*2*). Miller and Sayers state that, with this biological method of classification, which in a number of instances has been correlated with clinical observations and industrial surveys, it is quite possible to determine the pneumoconiotic potentialities of a dust in a relatively short time, usually 60 days. According to these investigators, an absorptive reaction may indicate that the dust is relatively harmless, while a proliferative reaction, characteristic of pure silica (quartz), may be associated with definite ability to produce a nodular type of pulmonary fibrosis. Dusts causing inert reactions should be considered as potentially harmful, though not as dangerous as those causing a proliferative response.

Experimental Technique

In the present study, each of the selected minerals was ground very finely in a ball mill. The resulting powder completely passed through a standard 325-mesh sieve in all cases and had an average particle size under 11 microns. No attempt was made to separate the dust into fractions by air-elutriation, since the 325-mesh screened material has been found to be adequate for this type of study. One gram portions of the dust were weighed out into small bottles containing glass beads, sterilized by heating 1 hour at 160° C., and suspended in 10 ml. of added sterile physiological saline solution. Two ml. of the suspension were injected intraperitoneally into each guinea pig. The hair

Table 1

Material injected	Amount injected intraperitoneally	Average particle size	Total animals injected	Percent gain in weight		
				35 days after injection	70 days after injection	105 days after injection
	Gram	*Microns*				
Calcite crystals	0.2	5.9	13	37.0	61.0	80.0
Quartz crystals	.2	7.1	13	33.0	36.0	51.0
Anthracite mineral	.2	6.3	12	2.0	44.0	81.0
Bituminous mineral	.2	8.3	12	.7	51.0	45.0
Lodestone ore	.2	8.9	15	15.0	30.0	68.0
Magnetite ore	.2	7.8	13	11.0	62.0	79.0
Hematite ore	.2	7.6	12	.6	25.0	45.0
Slag No. 1 (B. M. No. 49–397)	.2	10.7	12	14.0	93.0	84.0
Slag No. 2 (B. M. No. 49–398)	.2	10.0	12	.6 (loss)	19.0	14.0
Slag No. 3 (B. M. No. 49–367)	.2	10.8	12	24.0	21.0	23.0
Slag No. 4 (B. M. No. 49–303 (3))	.2	8.9	15	21.0	45.0	33.0
Slag No. 5 (B. M. No. 49–153)	.2	9.0	13	26.0	46.0	60.0
Slag No. 6 (B. M. No. 49–154)	.2	10.4	14	.6	22.0	67.0
Lyon Mountain ore tailings (B. M. No. 49–310 (4))	.2	8.1	16	22.0	36.0	35.0
Trap rock (B. M. No. 3088)	.2	8.8	12	15.0	.3	16.0
Obsidian	.2	8.7	12	16.0	12.0	37.0
Vitreous silica	.2	8.7	12	.6	21.0	65.0
Silica sand	.2	10.9	12	18.0 (loss)	13.0	51.0

was clipped over the abdomen, tincture of iodine applied, the injection made, and more tincture of iodine swabbed over the site of the injection. Twelve animals were used for each of the 18 test substances (table 1), and in those cases where early deaths occurred, the animals were replaced. Usually, three animals were killed for pathologic study at intervals of 35, 70, and 105 days. A few guinea pigs remained on test for a much longer period.

DESCRIPTION OF THE DUSTS STUDIED

Calcite. Selected, clear crystals of pure mineral calcite. Finely ground in a ball mill. Average particle size, 5.9 microns. Chemical analysis: acid insoluble material, 0.0 percent; silica, 0.0 percent.

Quartz. Selected Brazilian quartz crystals of mineral specimen quality. Finely ground. Average size of particles, suspended in normal saline solution for intraperitoneal injection, 7.1 microns.

Vitreous Silica. Fragments of vitreous silica. Made at Albany, Oreg., Station, U. S. Bureau of Mines, from Ottawa silica sand. Average particle size of injected material, 8.7 microns. X–ray pattern negative, indicating absence of crystalline material.

Silica Sand. Ottawa silica sand. Finely ground. Average size of suspended particles, 10.9 microns.

Obsidian. Pure mineral obtained from the Smithsonian Institution. X-ray diffraction pattern negative in general, but contained a trace of crystalline material. Average particle size, 8.7 microns.

Bituminous Coal. Pennsylvania mineral specimen. Average particle size, 8.3 microns.

Anthracite. Pennsylvania mineral specimen. Average particle size, 6.3 microns.

Magnetite., variety lodestone. Selected masses of native mineral. Average particle size, 8.9 microns.

Magnetite. Clifton Mines, St. Lawrence County, N. Y., mineral specimen. Average particle size, 7.8 microns.

Hematite, variety kidney ore. Mineral specimen. Average particle size, 7.6 microns.

Iron Ore Tailings. Lyon Mountain. U. S. Bureau of Mines No. 49–310 (4). Albany, N. Y. Eleven percent free silica, quartz (hardness, 7). Small amount orthoclase, $KAlSI_3O_8$ (hardness, 6). Small amount of magnetite, Fe_3O_4 (hardness, 7.4). Small amount unidentified crystalline material. Average particle size, 8.1 microns.

Trap Rock. U. S. Bureau of Mines No. 3088. Four percent free silica, alpha quartz. Large amount of feldspar, probably mostly labradorite, $n NaAlSi_3O_8$, $m CaAl_2Si_2O_8$. Medium amount of pyroxene, probably hedenbergite, $CaFe(SiO_3)_2$. Traces of magnetite, dolomite, and unidentified crystalline material. Average particle size, 8.8 microns.

Slag No. 1. U. S. Bureau of Mines No. 49–397. Water-quenched granulated slag. One percent free silica, SiO_2, alpha quartz. Small amount of melilite, $Na_2(Ca,Mg)_{11}(Al,Fe)_4(SiO_4)_9$. Trace of hematite, Fe_2O_3. Trace of aluminum calcium oxide, $Al_2O_3{\cdot}3CaO$. Trace of unidentified crystalline material. Average particle size, 10.7 microns.

Slag No. 2. U. S. Bureau of Mines No. 49–398. Air-cooled screenings. One percent free silica. Large amount of melilite. Small amount of pseudowollastonite, $CaSiO_3$. Trace of aluminum calcium oxide. Trace of unidentified crystalline material. Average particle size, 10.0 microns.

Slag No. 3. U. S. Bureau of Mines No. 49–367. Quenched blast-furnace slag. One percent free silica, SiO_2, alpha quartz. Possibly a trace of melilite, $Na_2(Ca,Mg)_{11}(Al,Fe)_4(SiO_4)_9$. Trace of unidentified crystalline material. Average particle size, 10.8 microns.

Slag No. 4. U. S. Bureau of Mines No. 49–303(3). Copper slag, Tennessee Copper Co., Ducktown, Tenn. Less than 1 percent free silica, quartz. Large amount of fayalite, Fe_2SiO_4. Considerable amount of unidentified crystalline material. (Hardness of this material not available.) Average particle size, 8.9 microns.

Slag No. 5. U. S. Bureau of Mines No. 49–153 (West Virginia). Crushed slag, ferro-chrome process, used for traction material at Alloy Mine, Alloy, West Virginia (not commercially available). Eighteen percent free silica, SiO_2, alpha quartz. Large amount of forsterite, Mg_2SiO_4. Large amount of spinel, $MgAl_2O_4$. Trace of unidentified crystalline material. Average particle size, 9.0 microns.

Slag No. 6. U. S. Bureau of Mines No. 49–154. Silico-manganese slag, Alloy, West Virginia. One percent free silica. Remainder—unidentified crystalline material. Hardness, 7.5. Average particle size, 10.4 microns.

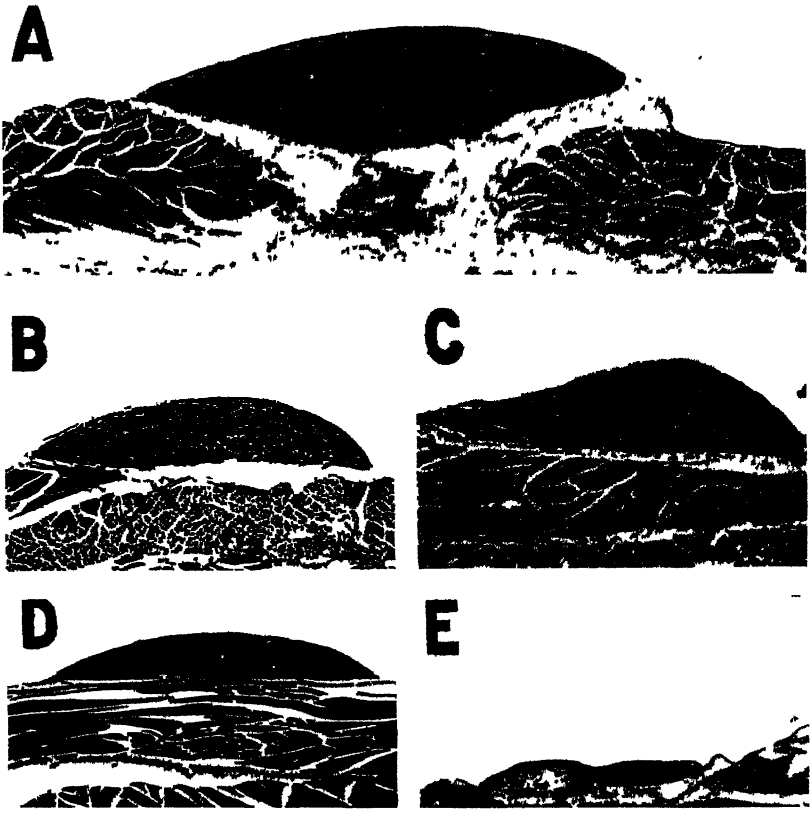

Figure 1. Peritioneal nodules in guinea pigs killed 35 days after injection of dust (× 10). A. Quartz. B. Slag No. 5. C. Lyon Mountain ore tailings. D. Anthracite. E. Calcite.

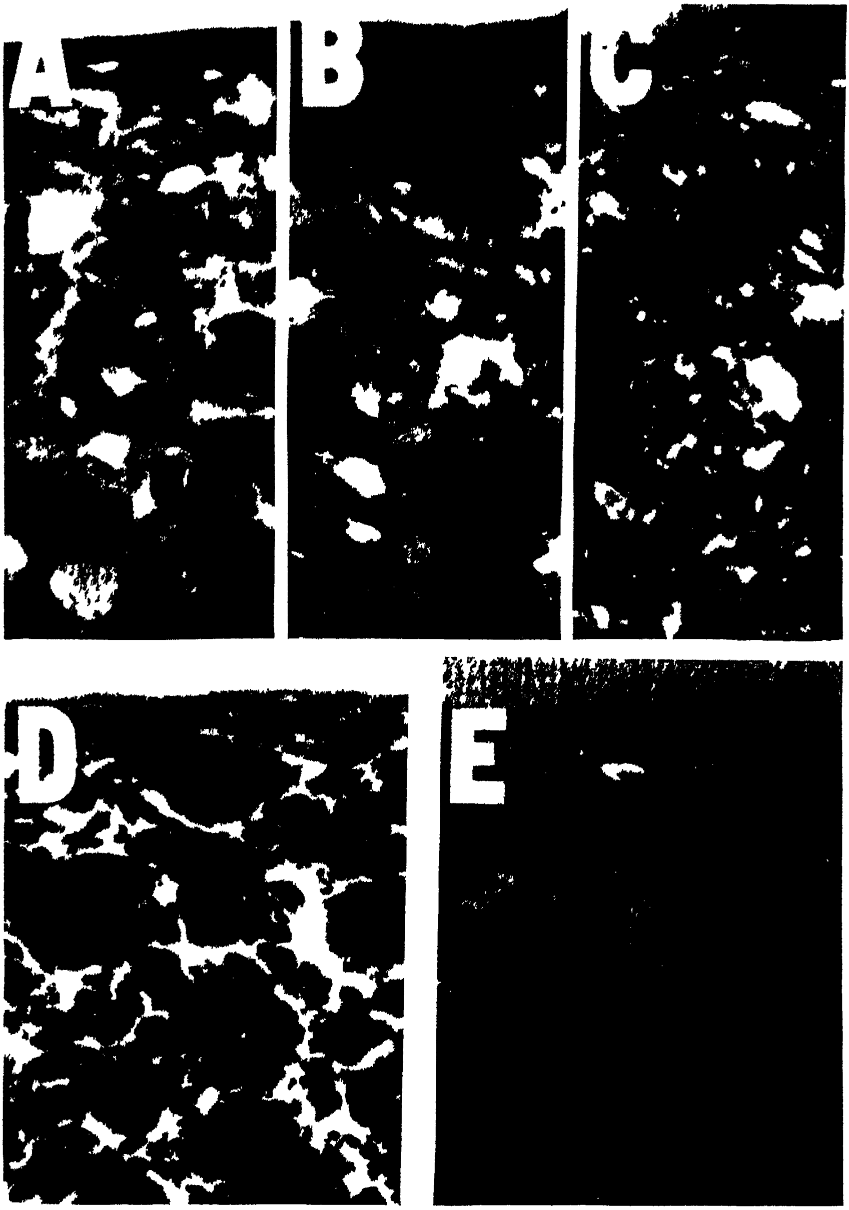

Figure 2. Same nodules as in figure 1 (× 400). All except 2D photographed with polarized light. Anisotropic particles appear white. A. Quartz. B. Slag No. 5. C. Lyon Mountain ore tailings. D. Anthracite. E. Calcite.

Gross Pathology

Autopsies were made on all guinea pigs that died or were killed for study. The gross findings were essentially similar to those described

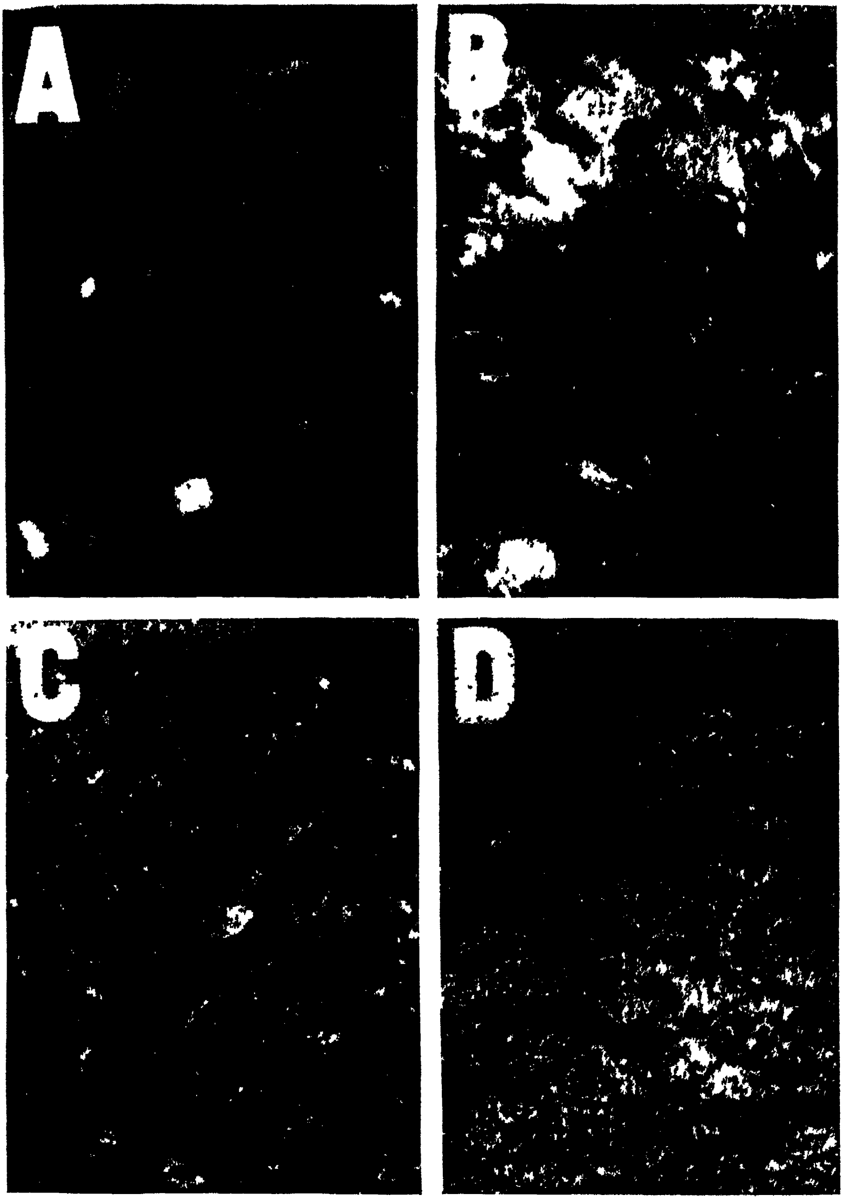

Figure 3. Peritoneal nodules at 105 days after injection stained for reticulum by Wilder's method (× 400). A. Quartz. B. Slag No. 6. C. Trap rock No. 3088 D. Obsidian. (All except 3D photographed with polarized light.)

by Miller and Sayers (*2*, *3*, *4*). Nodules, varying in color with the material injected, were often found throughout the peritoneal cavity, but the site of the largest collection was generally in the peritoneum of the anterior abdominal wall, the most dependent portion of the

Figure 4. Quartz at 105 days. Note necrotic area in lower left portion of figure. The particles appear translucent and less prominent than in figure 2A because nonpolarized light was used. (Azure eosinate; × 667.)

peritoneal cavity. The severity of the reaction to the dust was graded grossly on the basis of the number, size, elevation, and degree of coalescence of the nodules noted on the peritoneal surface of the anterior abdominal wall.

The most severe gross peritoneal nodular lesions were produced by silica sand, followed in decreasing order of severity by quartz, vitreous silica, trap rock No. 3088, obsidian, anthracite, slag No. 3, Lyon Mountain ore tailings, slag No. 1, slag No. 2, slag No. 5, slag No. 4, bituminous coal, lodestone, magnetite, hematite, and calcite. Because the severity of the lesions often varied considerably in animals given the same treatment, this order cannot be considered exact. Miller and Sayers (*2*, *3*, *4*) have classified the reaction caused by quartz as proliferative. Since the nodular lesions produced by silica sand and vitreous silica were similar in severity to those produced by quartz, they may be similarly classified with quartz as dusts producing a proliferative reaction. However, the reaction was somewhat atypical in that it was more severe in some animals killed at 35 days than in other animals, receiving the same dust (including quartz), killed at 70 or 105 days after the injection. Using the criteria of Miller and Sayers, we considered calcite as causing an absorptive reaction and the other dusts as producing either an inert or a modified proliferative reaction.

It must be emphasized that the classification of the reactions and the order of severity listed are tentative and based on gross findings only; they must be considered in conjunction with the character and

Figure 5. Silica sand at 105 days. Note similarity of reaction (giant cells and macrophages) to that of quartz shown in figures 2A and 3A. The particles are transparent and difficult to detect. (Azure eosinate; × 667.)

severity of the tissue changes produced by each powdered mineral dust as described below.

Microscopic Pathology

The tissues were fixed in formaldehyde. Whenever feasible, the histologic sections of the abdominal wall were made so as to include the central portion of the largest nodules. Routine paraffin sections were studied after staining with azure eosinate and Masson's trichrome stain, and after treatment with acidulated ferrocyanide for iron and frequently with silver impregnation methods for reticulum (*5*). In general, there was no consistent striking difference between the lesions at 35 and 105 days after inoculation with the dust. Nearly all the nodules were completely organized and traversed by a network of slender vascularized fibrous septa. A few of the larger nodules, particularly at 35 days, presented in the central portion one or more large masses of unorganized (not traversed by vascularized fibrous septa) dust particles often marginated by or admixed with some necrotic fibrinocellular exudate. Such unorganized dust aggregates were found occasionally even in nodules produced by relatively inert dusts, such as anthracite and bituminous coal. The fibrous septa were formed chiefly of mature connective tissue cells with a few lymphocytes and large mononuclear cells and a little collagen. Collagen tended to be somewhat more abundant at 105 days than at 35 days.

There were several types of reaction. The nodules produced by

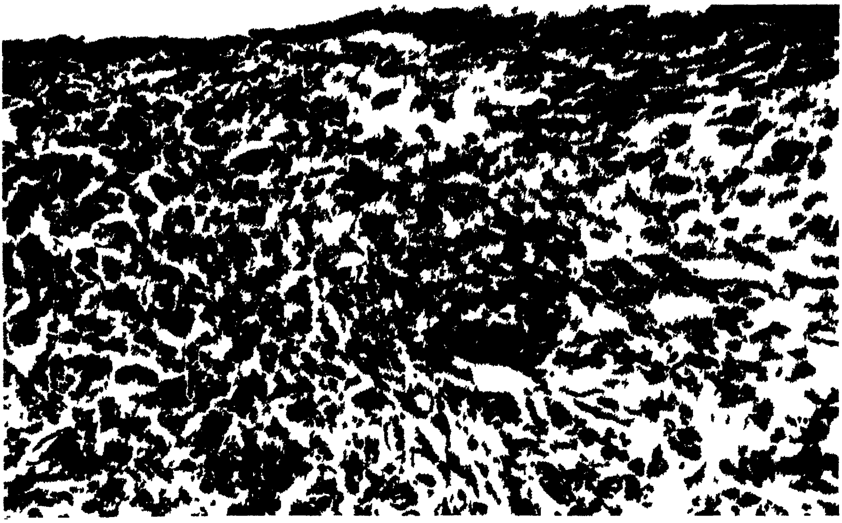

Figure 6. Vitreous silica at 35 days. Note fibrosis on the right and macrophages and giant cells on the left. The peritoneal surface is shown above. (Azure eosinate; × 267.)

anthracite, bituminous coal, lodestone, and hematite showed little other than a network of fibrous septa, the meshes of which were occupied by amorphous, dark masses and clumps of dust. Smaller dust masses occurred also in the cytoplasm of some of the septal cells. The dust in nodules evoked by lodestone gave the Prussian blue reaction for iron.

Other dusts produced a more severe cellular reaction with an outpouring of cells between the fibrous septa (interseptal spaces). There were variable numbers and proportions of lymphocytes, large mononuclear cells, macrophages, fibroblasts, and multinucleated foreign body giant cells. All of these as well as intermediary types were often present, but usually one or two types of cells predominated. The term "macrophage" is used here to denote a cell with a large round pale nucleus and relatively abundant cytoplasm often laden with dust particles, and "large mononuclear cell" is a term used for a somewhat smaller cell with a darker nucleus. Lymphocytes, mononuclear cells, and fibroblasts tended to be most numerous in the outer portion of the nodules and along the septa. Giant cells tended to vary with the number of large particles exceeding 10 microns in length. Reticulum or intercellular fine collagenous fibers were infrequent except in the outer interseptal spaces of some nodules showing numerous macrophages. Many nodules had a thin fibrous layer, chiefly along the peritoneal surface, but there was usually no marked fibrous encapsulation except in some nodules showing extensive central necrosis or suppuration.

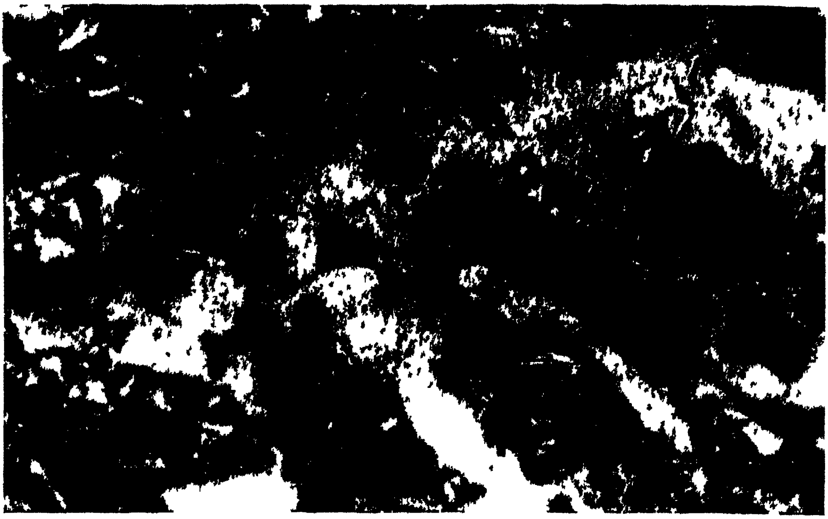

Figure 7. Vitreous silica at 105 days. Note necrosis in left upper portion of figure. (Azure eosinate; × 667.)

The most severe interseptal cellular reaction was induced by quartz. There was a predominance of macrophages and of large multinucleated giant cells, many containing large particles. The bulk of the dust consisted of scattered, irregularly shaped, anisotropic particles ranging chiefly from 10 to 25 microns, with some smaller and larger particles. Fibroblasts were numerous in some nodules, and intercellular collagen and reticulum were scanty to abundant. Three of the nine animals presented nodules showing widespread necrosis of cells and intense eosinophilic degeneration of septal collagen. Silica sand evoked a somewhat similar reaction with a predominance of macrophages.

The other dusts provoked an interseptal cellular reaction less than that of quartz but greater than that of the anthracite group mentioned above. In nodules induced by Lyon Mountain ore tailings, the interseptal spaces generally presented dense clusters of dust particles marginated by and occasionally admixed with relatively few cells, chiefly small and large mononuclear cells. Obsidian and slag No. 4 often showed a somewhat similar reaction. With magnetite, and slags Nos. 1, 2, 3, and 5, the dust clusters were relatively fewer, smaller, and less compact; the interseptal cellular reaction was moderate to marked, with giant cells, macrophages, mononuclear cells and lymphocytes occurring in variable proportions. Mononuclear cells tended to predominate in nodules produced by magnetite and slag No. 5; and macrophages, in those by other slags.

With trap rock, the particles were more dispersed in the interseptal spaces, and cellular reaction was moderate with a predominance of macrophages, many of which contained particles. A somewhat

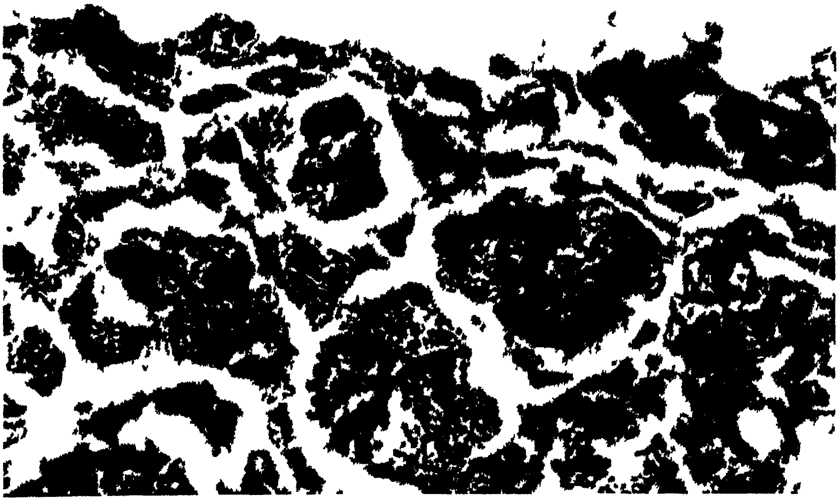

Figure 8. Trap rock No. 3088 at 105 days. Note abundance of particles and cells in the interseptal spaces. The septal network is fairly distinct due to shrinkage of the cells entailed in the process of preparing paraffin sections. (Azure eosinate; × 667.)

similar reaction was induced by vitreous silica and occasionally by obsidian and other dusts. The fibrous septa of the nodules showed a variable amount of dust and cellular infiltration and were not clearly distinguishable in some nodules showing a marked interseptal cellular reaction.

The severity of the reaction was graded by estimating the percentage of dust by volume in the nodules. This was done by Chalkley's method for the quantitative morphologic analysis of tissues (*6*). The percentage of dust often varied moderately in different nodules and in different animals and intervals after inoculation, but it generally fell within a certain range for a given dust, as shown in table 2.

It is interesting to note that dusts such as anthracite, bituminous coal, and hematite, which are relatively harmless to man, produced

Table 2

(A) Mild reaction*	(B) Moderate reaction*	(C) Marked reaction*	(D) Severe reaction*
Anthracite	Lyon Mountain ore tailings**	Slag No. 1	Quartz.
Bituminous coal	Magnetite	Slag No. 2	Silica sand.
Hematite	Obsidian	Slag No. 3	
Lodestone	Slag No. 4**	Slag No. 5	
	Trap rock No 3088	Vitreous silica	

*The reaction was classified as mild if more than 40 percent of the nodule was occupied by dust, moderate if the percentage was between 25 and 40, marked if between 10 and 24, and severe if under 10 percent.

**After this study was completed, it was found that Brown and Schrenk (*1*) had suggested as a health measure the use of substances of a similar composition as traction material. The recommendation was based on the low silica content of these materials as well as on practical experience.

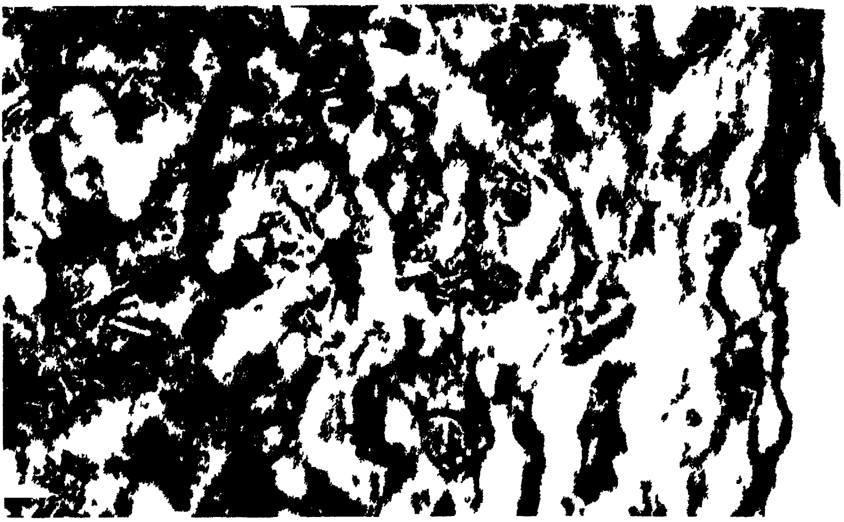

Figure 9. Obsidian at 105 days. Note particle-laden macrophages on the left and beginning subperitoneal fibrosis on the right. (Azure eosinate, × 667.)

in this study only a mild peritoneal reaction in guinea pigs, and that quartz, which can produce severe silicosis in man, produced a severe peritoneal reaction in guinea pigs. These findings suggest that the pulmonary reaction in man (like the peritoneal reaction in the guinea pigs) may be greater to dusts in groups B and C than dusts in group A, but less than to those in group D. The sample of magnetite, which

Figure 10. Slag No. 1 at 105 days. Note lymphocytes with small, dark, round nuclei in outer portion of nodule below; macrophages with larger, paler nuclei tend to predominate elsewhere. (Azure eosinate; × 667.)

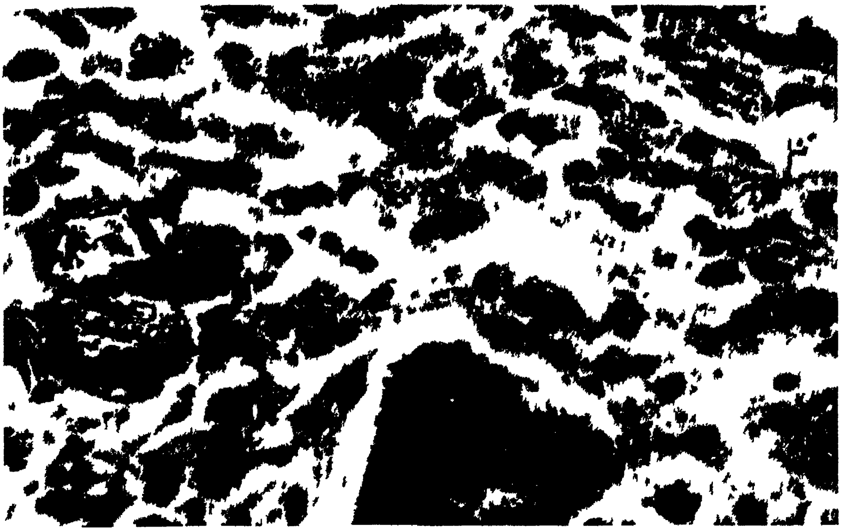

Figure 11. Slag No. 2 at 105 days. Note marked cellular reaction with lymphocytes, macrophages, and large multinucleated giant cells. (Azure eosinate; × 667.)

produced a moderate peritoneal reaction, contained relatively many more doubly-refractile particles (free silica) than the sample of lodestone (selected masses of magnetite), which produced only a mild reaction. Slag No. 6 is not included in the table because nodules satisfactory for gradings were found in only four animals; the average dust concentration was 23 percent. Calcite is not included because it produced an absorptive reaction.

The microscopic appearance of the nodules produced by anthracite, bituminous coal, hematite, lodestone, and quartz have been described in some detail. Following are more detailed histologic descriptions of nodules produced by some of the other dusts.

Calcite Crystals. Only one guinea pig, killed at 35 days, showed a definite peritoneal lesion. This consisted of two coalescent nodules, each about 1.5 mm. in width and 0.4 mm. thick. Lying chiefly in the outer portion of the nodules were some iron-positive pigment masses and a few scattered transparent birefringent particles measuring 5 to 25 microns. One nodule showed slight, and the other extensive, central necrosis and peripheral fibrous encapsulation. Cellular reaction was marked with a predominance of large mononuclear cells and fibroblasts and occasional multinucleated giant cells. Intercellular collagen was moderately abundant.

Lyon Mountain Ore Tailings. The peritoneal nodules showed a coarse network of slender fibrous septa and large interseptal clusters of irregularly shaped transparent and light brown particles predominantly from 2 to 10 microns in diameter. Many of the particles were doubly refractile, and some gave the Prussian blue reaction for

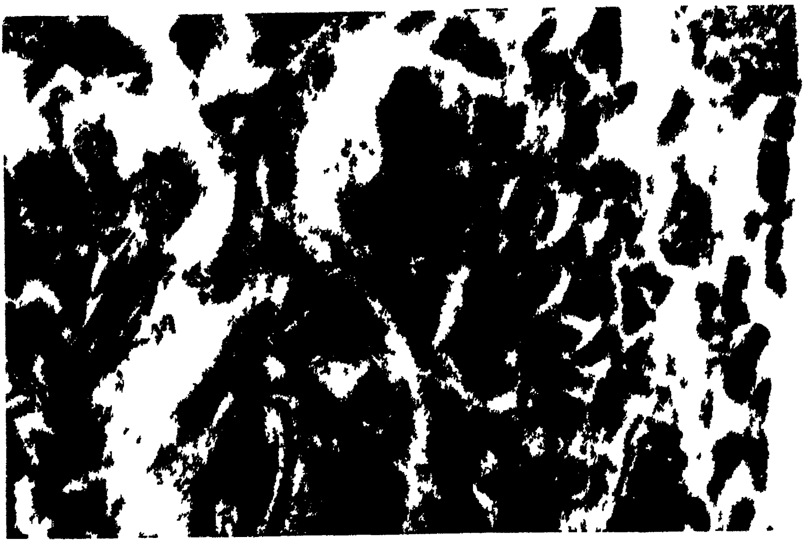

Figure 12. Slag No. 3 at 105 days. Peritoneal surface is on the right. (Azure eosinate; × 667.)

iron. The clusters were marginated by and occasionally admixed with relatively few cells, chiefly mononuclear cells. There was little or no interseptal reticulum.

Magnetite. The dust in the nodules was rather abundant, lying chiefly in the meshes of a network of vascular fibrous septa. There were many small, dark brown, amorphous masses and clumps giving the Prussian blue reaction for iron and many scattered, transparent to light brown, irregularly shaped particles, 2 to 75 microns long, some of which were doubly refractile and did not react like iron. Interseptal cellular reaction was moderate; large mononuclear cells often predominated, but there were also numerous macrophages and multinucleated giant cells. Interseptal collagen was scanty or absent.

Obsidian. The dust in the nodules was moderately abundant and fairly homogeneous. It was composed chiefly of irregularly shaped, translucent or light brown, isotropic particles predominantly between 2 and 10 microns in length. In most nodules, the particles lay chiefly in the interseptal spaces in dense clusters marginated by and occasionally admixed with relatively few cells, chiefly small mononuclear cells. In one nodule from an animal killed at 105 days, the particles were dispersed and often engulfed by macrophages. Reticulum was fairly abundant in the interseptal spaces. The nodules from several other animals showed a similar macrophage reaction in their peripheral portions.

Silica sand. The peritoneal nodules contained a relatively small amount of dust consisting chiefly of scattered, irregularly shaped, transparent and light brown, anisotropic particles ranging principally

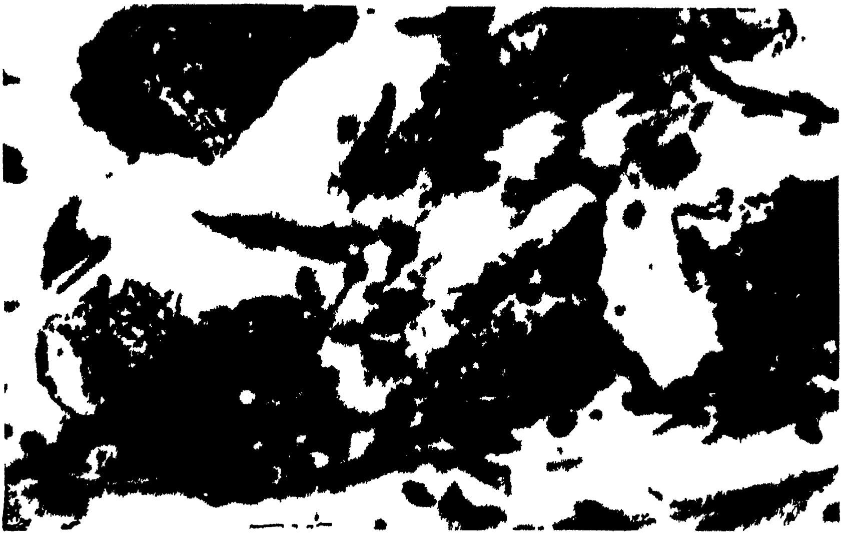

Figure 13. Slag No. 5 at 105 days. Peritoneal surface is below. (Azure eosinate; × 667.)

between 10 and 100 microns in maximum diameter. Clusters were uncommon. Cellular reaction was severe with a predominance of macrophages and fewer large multinucleated giant cells, some of which contained particles. One nodule showed a small area of oxyphilic necrosis. Intercellular reticulum and collagen were moderately abundant.

Silica, vitreous. The nodules showed a moderate abundance of dust composed chiefly of irregularly shaped, translucent, isotropic particles predominantly from 2 to 15 microns in diameter. Some nodules had a distinct network of vascular, fibrous septa, in the meshes of which were large clusters of particles admixed with relatively few cells. In one such nodule from an animal killed at 105 days, the fibrous septa showed marked thickening with extensive hyalinization and oxyphilic degeneration. In most nodules, the network of fibrous septa was less distinct, and the dust was disposed in the interseptal meshes as small clumps or individual particles admixed with and often engulfed by numerous cells, chiefly macrophages. Intercellular collagen or reticulum was scanty except near the periphery of the nodules, where the macrophages often seemed to grade into fibroblasts and connective tissue cells.

Slags Nos. 1, 2, and 3. The peritoneal nodules produced by slags Nos. 1, 2, and 3 were essentially similar histologically, though the composition of the dust differed somewhat. The dust was moderately abundant and consisted chiefly of irregularly shaped, translucent particles, predominantly from 5 to 50 microns which occurred singly and in small clumps. There were also some brown and black particles

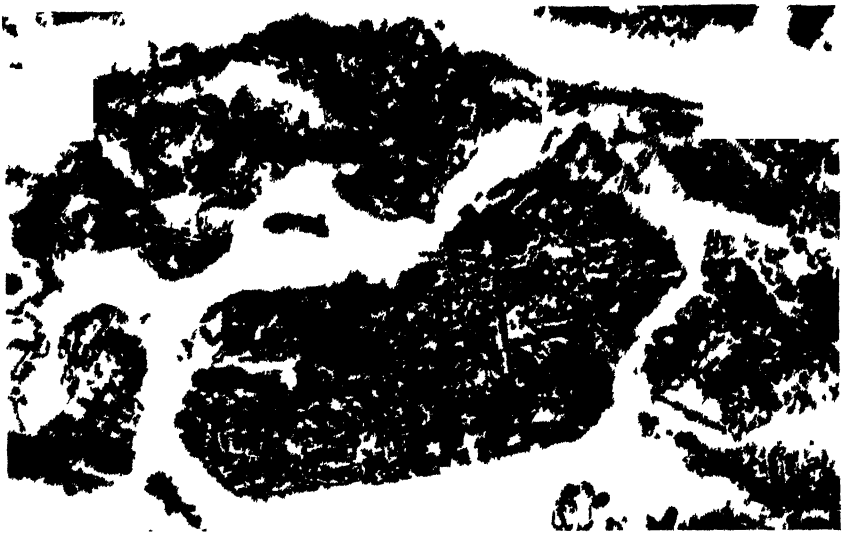

Figure 14. Lyon Mountain ore tailings at 105 days. The interseptal spaces contain large compact masses of particles with relatively few cells, their nuclei appearing black. (Azure eosinate; × 667.)

and amorphous masses. Only a few particles were doubly refractile or gave the Prussian blue reaction for iron. There was a moderate to marked interseptal cellular reaction with a predominance of macrophages, many of which contained dust particles. There were also a moderate number of lymphoid cells and multinucleated foreign body giant cells. Intercellular reticulum appeared in moderate amount in some nodules and scanty in others. Several nodules contained unorganized large dust masses.

Slag No. 4. The nodules contained moderately abundant dust consisting chiefly of interseptal clusters of fine, brown particles giving the Prussian blue reaction for iron. There were also occasional isotropic and anisotropic larger particles (5 to 25 microns) of variable size, shape, and color. There was little or no interseptal cellular reaction except in several nodules showing some large mononuclear cells and macrophages in occasional interseptal spaces, chiefly peripherally. Reticulum was scanty or absent.

Slag No. 5. The nodules were traversed by an irregular network of slender, vascular, fibrous septa. There was a moderate amount of dust lying chiefly in the interseptal spaces. The particles appeared transparent, brown, or occasionally black. Many were doubly refractile, and some gave the Prussian blue reaction for iron. Coarse particles (5 to 25 microns) predominated, but there were also many fine particles often loosely arranged in small clusters. Many particles were intracellular. Interseptal cellular reaction was marked with a predominance of multinucleated giant cells and large mononuclear

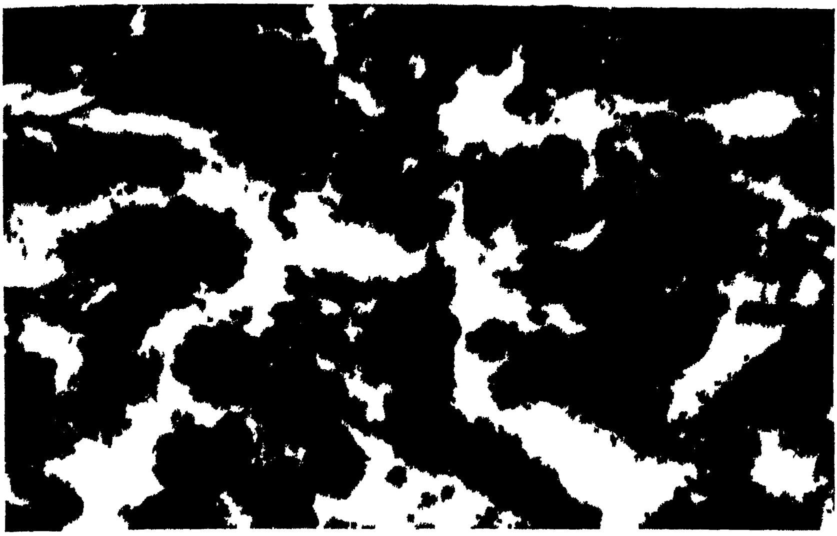

Figure 15. Slag No. 4 at 105 days. Note scant cellular reaction and similarity to anthracite (fig. 2D). (Azure eosinate; × 667.)

cells grading into macrophages. Interseptal reticulum was scanty to moderate in amount.

Slag No. 6. The peritoneal nodules showed a moderate to marked cellular reaction with a predominance of macrophages. Particles were generally light brown or translucent, often anisotropic, and varied markedly in size and shape, but particles over 10 microns predominated. Large clusters were uncommon. Interseptal reticulum was scanty or absent.

Trap Rock No. 3088. The dust in the peritoneal nodules was moderately abundant. The dust particles varied markedly in size and shape. Many were doubly refractile, and some gave the Prussian blue reaction for iron. Most of the particles were translucent, but some were brown or black. They occurred singly and in small clumps. Interseptal cellular reaction was marked with a predominance of macrophages, many of which contained dust particles. There were also many lymphoid cells and a few multinucleated giant cells. Reticulum was variable in amount. There was often some fibroblast proliferation, particularly along the periphery, with the formation of a capsule.

Summary and Conclusions

The use of sand as traction material for mine locomotives has been considered a potential health hazard. The purpose of this study was to determine the relative safety of possible substitute materials. Guinea pigs were injected intraperitoneally, according to the method of Miller and Sayers, with suspensions of the various powdered materials or dusts. The dusts caused a cellular reaction with the formation of peritoneal nodules. An attempt was made to grade the severity of the reaction objectively by estimating the percentage of dust by volume in the nodules, using Chalkley's method for the quantitative morphologic analysis of tissues. The severity of the reaction was considered to vary inversely with the percent of dust in the nodules.

With this method of grading, it was found that quartz and silica sand produced a severe cellular reaction. A marked cellular reaction was induced by vitreous silica and slags Nos. 1, 2, 3, and 5. A moderate cellular reaction was induced by Lyon Mountain ore tailings, magnetite, obsidian, slag No. 4, and traprock No. 3088. A mild cellular reaction was evoked by anthracite, bituminous coal, hematite, and lodestone.

Miller and Sayers have noted, at least in some instances, a correlation between the severity of the peritoneal reaction in guinea pigs and the pulmonary response in man. In this study, it was noted that anthracite, bituminous coal, and hematite, which are relatively harmless to man, produced only a mild peritoneal reaction in guinea pigs, and that quartz, which can produce severe silicosis in man, produced a severe peritoneal reaction in guinea pigs. These findings suggest that the materials which produced a mild or moderate peritoneal reaction in guinea pigs are likely to be less harmful to man than those, such as quartz and silica sand, which produced a marked or severe peritoneal reaction. Among the materials which fulfilled this condition were iron ore tailings corresponding to the composition indicated, slag No. 4, U. S. Bureau of Mines No. 49–303(3), and traprock conforming to the type described. These materials also appear to have the requisite hardness, commercial availability, and other properties suitable for use as traction material.

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1080 (Sodium Fluoroacetate) Poisoning of Rats on Ships

By John H. Hughes, Ph. D.*

Poison compound 1080 (sodium fluoroacetate) is in its fifth year of use by the Public Health Service for shipboard rat control. Following the successful initial use of this poison on ships by the Division of Foreign Quarantine, the program was expanded. Ten-eighty poisoning has replaced the standard hydrocyanic acid gas fumigation on approximately one-half of the ships on which rat control measures are required.

This report gives results obtained by shipboard use of 1080 at quarantine stations during a period of nearly 4 years.

Ten-eighty, unfortunately, is highly toxic to man as well as other animals; it should be used only by carefully trained persons under conditions which offer a minimum of hazard. THERE IS NO KNOWN ANTIDOTE FOR 1080 POISONING.

General instructions and information on the value and hazards of the use of 1080 are presented in a National Research Council brochure (*2*), which should be studied carefully by persons interested in using 1080. This writer's earlier report on the poison gave details for handling it and precautions to be observed in its use, particularly on shipboard (*1*).

Procedures

Using 1080 on Ships

For the control of rats on ships the usual method of using 1080 is to place it in water. The recommended concentration is one-half ounce or 14 grams of the poison dissolved in one gallon of water. Solid baits are sometimes used.

Water containing 1080 is readily accepted by rats, but some effort was made to enhance it by adding attractants. Vanilla extract and anise oil were used in the poison solution on a number of ships, but without conclusive results. It is doubtful that attractants used in conjunction with 1080 would be of any significant value in shipboard rat control.

A warning color, produced by adding nigrosine black dye to 1080, has been recommended as an added precaution (*3*).

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A paper container, shown in figure 1, designed specifically for 1080-poisoning operations (*2*), has largely replaced the type of container used earlier in the program and shown in figure 2. This new squat-type container, with a capacity of three-fourths fluid ounce, is practically tip-proof; it is colored light brown, and it is appropriately labeled.

Occasionally, pint-size chicken watering fountains have been used in making large quantities of 1080 solution available for rats.

Flea Control

An important reason for destroying rats on ships is obviously to eliminate their flea parasites, some of which are responsible for transmission of the plague organism to man. A measure of flea control is achieved indirectly by destruction of rat hosts. However, since 1080 poisoning does not directly accomplish flea control, an insecticide was employed in conjunction with the rat poisoning program. This was done with the hope that many of the fleas which might be present on dead or dying rats, or which might escape from them, would be killed. A thin layer of 10 percent DDT (dichloro-diphenyl-trichloroethane) dust was sprinkled around each 1080 station for a distance of about 2 feet as shown in figure 2; it was also applied along rat runways and around suspected harborages.

Later, laboratory studies were conducted to determine the effectiveness of DDT in flea control when employed in this manner on ships. This work (*4*), which was preliminary, showed a high rate of flea control when infested rats walked through a 24-inch-long box with a 2½- by 3-inch passageway in which folds of cheesecloth impregnated with 10 percent DDT dust were fastened at the top, the floor being covered with DDT dust. In other tests, when infested rats were required only to walk in 10 percent DDT dust for a brief period, the flea mortality was much lower.

The laboratory results were not conclusive, but suggest that if flea control is desired a rat must be more thoroughly subjected to DDT than it is when it walks only through a thin layer of the insecticide.

In effectiveness, the flea-control method employed on ships would seem to approach the more effective of the two laboratory methods reported. Many rats poisoned by 1080 on ships were found dead within the area of DDT near poison cups (fig. 2). Fleas escaping from these rats would undoubtedly come in contact with the DDT. Rats that did not die in the DDT-treated area sometimes spent several minutes in the insecticide while consuming poisoned water, or made several trips through the insecticide while traveling to and from the poison stations, thus increasing the probability of exposure of the fleas to the DDT.

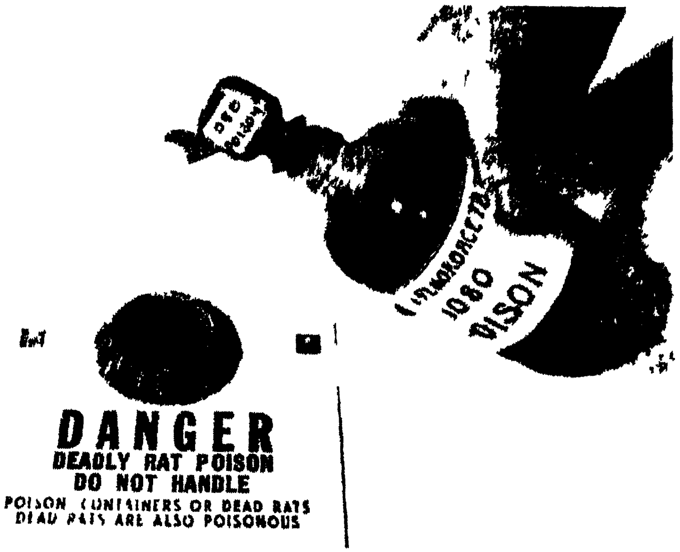

Figure 1. Ten-eighty poison station and plastic bottle used to pour 1080 solution. White powder is 10 percent DDT.

The rats shown in figure 2 were photographed as found on a ship by quarantine inspectors approximately 19 hours following distribution of 1080.

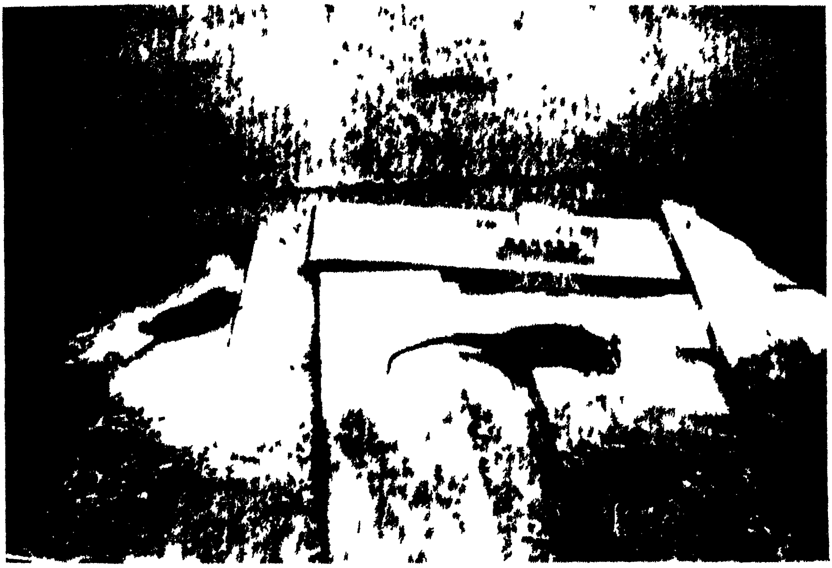

Figure 2. Rats killed by 1080 in ship's hold. White powder is 10 percent DDT (photograph by U. S. Army).

Results

Since the inception of the 1080-poisoning program in 1945, this poison has been used on 379 ships at eight quarantine stations, located at Baltimore, Boston, Los Angeles, Mobile, New Orleans, New York, San Francisco, and Seattle. These stations presently conduct approximately 75 percent of all Public Health Service shipboard rat-control activities, including 1080 poisonings and HCN (hydrocyanic acid gas) fumigations. The number of ships recorded includes 96 reported in 1947 (*1*) and 283 on which 1080 has been used since that time. Table 1 gives detailed data showing results during the two phases of the work and for the over-all study. The efficiency, or ratio of rats killed by 1080 to the rats estimated to be aboard, was 91.8 percent for the last 283 ships, a slight increase over the efficiency for the first 96 ships. The efficiency for all 379 ships reported for the entire period 1946–49 at the eight stations was 89.9 percent, which is also favorable.

Table 1. *Comparison of 1080 data*

Period	Number of ships	Dispensers		Solution 1080 (ounces)	Number of rats		Percent of estimate killed
		Cups	Fountains		Estimated	Killed	
1946–47 [1]	96	7,893	132	7,516	1,475	1,262	85.5
Average per ship		82.2	1.37	78.3	15.36	13.1	
1947–49 [2]	283	21,633	66	18,334	3,550	3,259	91.8
Average per ship		76.4	0.23	64.8	12.54	11.5	
1946–49 [2]	379	29,526	198	25,850	5,025	4,521	89.9
Average per ship		77.9	0.52	68.2	13.3	11.9	

[1] For Boston, New Orleans, New York, and Seattle.
[2] For Baltimore, Boston, Los Angeles, Mobile, New Orleans, New York, San Francisco, and Seattle.

During the program a large number of rats (4,521) were killed by 1080 on ships and found by quarantine inspectors; this represents an average of 11.9 per ship. There was also evidence of many additional dead rats that were not found.

In the distribution of 1080 solution, the average number of paper cups used per ship was 77.9; the average amount of poison solution used per ship was 68.2 ounces. All remaining poison solution was collected and disposed of at the end of the exposure period for a ship. The poisoned water was not ordinarily reused, since the concentration would be increased as a result of evaporation of water. An increase in concentration of the solution would probably make it less desirable as a rodenticide and would present a greater hazard to animals other than rats.

Dead rats were destroyed by incineration after being identified and studied. Compound 1080 decomposes at approximately 200° C. or 392° F. (*2*), losing its poisonous quality.

Table 2. *1080-poisoned rats found dead per ship* [1]

Number of rats killed per ship	Number of ships	Percent of all ships on which rats were found
0	42	
1–10	221	58.3
11–20	55	14.5
21–35	36	9.5
36–75	20	5.3
76–106	4	1.1
435	1	0.3
Total	379	

[1] At Baltimore, Boston, Los Angeles, Mobile, New Orleans, New York, San Francisco, and Seattle.

The number of rats found dead from 1080 poisoning ranged from 0 to 435 per ship (table 2). One to 10 dead rats per ship were found on 221 (58.3 percent) of the 379 ships reported; 11 to 20 were found on 55 (14.5 percent) of the ships; 21 to 35, on 36 (9.5 percent); and 36 to 75, on 20 (5.3 percent). Four ships had 76 to 106 dead rats each. One ship that had been hauling cattle and horses aboard had the exceedingly large number of 435 rats dead from 1080 poisoning.

Table 2 also shows that no rats were found on 42 (11.1 percent) of the 379 ships reported. There was evidence of comparatively few rats on many of these ships prior to using the poison; hence, the significance of this seeming inefficiency of 1080 on the 42 ships is not

Table 3. *Deratization activities by individual compartments of 197 ships* [1]

Compartment	Number of times: Rats estimated	Number of times: Rats found	Percent of estimated times rats found	Number of rats: Estimated	Number of rats: Killed	Percent of estimated number killed
Holds No.:						
1	92	67	72.8	314	234	74.5
2	91	67	73.6	297	283	95.3
3	90	74	82.2	350	339	96.9
4	81	55	67.9	285	285	100.0
5	73	41	56.2	219	148	67.6
6	4	2	50.0	9	4	44.4
				[2] (1,474)	[2] (1,293)	
Shelter deck space	17	15	88.2	90	76	84.4
Bunker space	2	2	100.0	12	9	75.0
Engine room, shaft alley	3	1	33.3	5	2	40.0
Forepeak and storeroom	29	7	24.1	68	25	36.8
Afterpeak and storeroom	9	3	33.3	16	4	25.0
Other storerooms	26	17	65.4	56	51	91.1
Lifeboats and boat decks	48	33	68.8	113	84	74.3
Chart and wireless room	2	1	50.0	4	1	25.0
Galley and bakery	16	13	81.3	41	25	61.0
Pantry	6	2	33.3	21	4	19.0
Saloon	1	0	0.0	1	0	0.0
Messrooms	5	5	100.0	7	6	85.7
Quarters	19	12	63.2	44	21	47.7
Toilets	4	1	25.0	6	2	33.3
Lockers	2	2	100.0	2	2	100.0
Workshops	2	2	100.0	2	2	100.0
Miscellaneous spaces	14	10	71.4	28	26	92.9
All	636	432	67.9	1,990	1,633	82.1

[1] At Baltimore, Boston, Mobile, New Orleans, New York, San Francisco, and Seattle.
[2] Total for holds.

great. Actually, not more than 5 rats were estimated on each of 25 ships, and not more than 2 rats were estimated on each of 19 of these.

Relative Distribution of Rats on Ships

The relative distribution or occurrence of rats on ships is indicated in table 3, which considers estimates and actual findings in individual compartments and in groups of compartments or areas on 197 ships. These estimates and findings of dead rats. made by well-trained inspectors, are reasonably accurate for many ships, but are sometimes very difficult or impossible to make, depending primarily on the nature and quantity of cargo present.

The presence of rats in 636 aggregate compartments and areas on the 197 ships was suggested by quarantine inspectors. Rats killed by 1080 were found in 432, or 67.9 percent, of the times they were thought to be present. The greatest number of dead rats, 1,293, or 79.2 percent of the total rats killed by 1080, was found in the ships' holds. This should not be considered unusual in view of the extensive area involved and the various types of cargo, including food products, stored in these spaces. The percent of estimated rats killed by 1080 in all compartments on the 197 ships was 82.1.

Inspection of Ships for Poisoned Rats

Inspection of ships for dead rats following distribution of 1080 is made usually after an overnight shipboard exposure of the poison. Ordinarily the exposure period is approximately 18 hours, but it is sometimes much longer. Inspections for dead rats are made daily while 1080 is present on ships, and they are often continued following its removal. The number of inspections is determined by the degree of infestation, nature and quantity of cargo, and duration of the ship's stay in port. Most often only one or two inspections per ship are made for the purpose of finding dead rats, but as many as nine have been made on a ship during its unloading.

Table 4 gives inspectional data for 376 of the ships included in the total study. As may be seen, first inspections were by far the most important. Of 4,394 dead rats found, 68.8 percent were accounted for during first inspections; 18.3 percent of the dead rats were found during second inspections, and only 13.0 percent were found during the remaining inspections.

The average length of time from placement of 1080 on the ships till the end of the respective inspection periods ranged from 22.3 hours for the first inspections to 165.9 hours, or almost 7 days, for the sixth and other inspections included therewith; this represents an average of 53.9 hours per ship.

Table 4. *Inspections made and rat mortality for 376 ships*

All stations[1]	Inspections						
	First	Second	Third	Fourth	Fifth	Sixth[2]	All
Number of inspections made	376	227	127	66	29	22	847
Average duration of study (hrs.)[3]	22.3	55.1	89.5	121.2	149.4	165.9	53.9
Total dead rats found	3,021	803	271	175	83	38	4,394
Average number of rats found	8.0	3.5	2.1	2.7	2.9	1.7	5.2
Percent of all rats found	68.8	18.3	6.2	4.0	1.9	.9	-
Percent of total inspections	44.4	26.8	15.0	7.8	3.4	2.6	

[1] At Baltimore, Boston, Los Angeles, Mobile, New Orleans, New York, San Francisco, and Seattle
[2] Four records for inspections 7, 8, and 9 included.
[3] From beginning of 1080 exposure to end of inspection period

Species and Sex of Rats Found

The kind and sex of rats found were noted for 3,924 (86.8 percent) of the 4,521 rats killed by 1080 at the eight stations named in table 5. Three species recovered from ships were: the black rat, *Rattus rattus rattus* (Linnaeus); the Alexander, gray, or roof rat, *Rattus rattus alexandrinus* (Geoffroy); and the Norway, brown, or sewer rat, *Rattus norvegicus* (Berkenhout). The black rat was reported most often, comprising 47.7 percent of the rats found; the Alexander rat was second in abundance with 30.9 percent, and the Norway rat was last with 21.4 percent. There were more females than males reported for each species.

Although the number of dead rats differed with species and with sex, there was no apparent difference in the susceptibility to 1080 poisoning. The time required to produce death from poisoning was reported to have varied from less than 30 minutes for some rats to several hours for others, presumably depending largely on the quantity of poison consumed.

Table 5. *Species and sex of rats killed by 1080*

Station	(Black rat) *Rattus rattus rattus*		(Alexander rat) *Rattus rattus alexandrinus*		(Norway rat) *Rattus norvegicus*		All species		Total determinations made
	Male	Female	Male	Female	Male	Female	Male	Female	
Baltimore	1	0	0	0	3	1	4	4	8
Boston	63	108	168	220	51	56	282	382	664
Los Angeles	0	0	0	0	6	1	6	1	7
Mobile	0	0	9	15	73	74	82	89	171
New Orleans	103	300	155	293	0	1	258	594	852
New York	107	452	10	47	259	271	706	773	1,479
San Francisco	5	1	1	2	0	0	6	3	9
Seattle	230	201	128	135	22	15	380	354	734
Total	809	1,063	501	712	414	425	1,724	2,200	3,924
	1,872		1,213		839		3,924		-------
Percent of all determinations	47.7		30.9		21.4		43.9	56.1	--------

Summary

Poison compound 1080 (sodium fluoroacetate) has been used successfully on ships as a rat control measure for more than 4 years.

To kill fleas, DDT dust is employed as a supplement to the 1080 poisoning procedure.

As many as 435 rats were found dead from 1080 poisoning on one ship. However, on most ships not more than 10 dead rats were found, and on 42 none. Very few rats were estimated for the 42 ships. Rats were found most often and in the greatest numbers in the ships' holds.

Usually one or two daily inspections are made for dead rats on ships following an approximate 18-hour exposure of the poison.

Three species of rats found on ships were: the black rat, *Rattus r. rattus*; the Alexander rat, *Rattus r. alexandrinus*; and the Norway rat, *Rattus norvegicus*. The black rat was found most often. Female rats were predominant in all species found.

ACKNOWLEDGMENT

Grateful acknowledgment is made to the medical officers in charge of the quarantine stations, to sanitary inspectors, and to others who were responsible for conducting the 1080-poisoning program on ships, and who made available the data used in this report.

REFERENCES

(*1*) Hughes, J. H.: Studies in deratization of surface vessels by means of 1080 (sodium fluoroacetate). Pub. Health Rep. **62**:933 (1947).

(*2*) National Research Council: Instructions for using sodium fluoroacetate (compound 1080) as a rodent poison. Revised October 1948, 11 pp., mimeographed.

(*3*) National Research Council: Addendum to instructions for using sodium fluoroacetate (compound 1080) as a rodent poison. Revised October 1948. January 1949, 1 p., mimeographed.

(*4*) Joyce, C. R.: Unpublished report.

WHO Publishes New Boundaries for Yellow Fever Danger Zones

A revised delineation of the two zones of prevalence of the yellow fever virus in the tropical belts of the Americas and of Africa was published in the World Health Organization's Weekly Epidemiological Record June 28, 1950.

The delineation, a revision of that made by UNRRA in 1945–46, was drawn up by a WHO panel of experts last December, and finally accepted by all WHO Member States attending the Third World Health Assembly in May. According to international sanitary agreements, countries are required to take special quarantine measures (inoculation, disinfection, etc.) against persons and transports coming from or going to the zones concerned.

The endemic yellow fever area in Africa is limited in the north by a line from the mouth of the Senegal River in French West Africa to Eritrea (excluding the port of Massawa) and extends southward to the 18th degree of latitude enclosing part of Angola in the west, the major part of the Belgian Congo, and all of Kenya in the east. Djibuti and the rest of French Somaliland were excluded from the endemic area by the December 1949 revision, while parts of Bechuanaland and all of Nyasaland were added to it. Modifications result partly from surveys on the occurrence of the disease, and partly from the results of anti-*aegypti* measures in urban communities.

In America the endemic zone comprises Venezuela, Colombia, the British, Dutch and French Guianas, and parts of Brazil, Peru, Bolivia and Ecuador, but excludes certain northern ports. In December, the experts also decided to exclude the port of Manaos, Brazil, which was reported free of *Aedes aegypti.*

Further revision will take place as the situation warrants. In Africa plans are being made for a further study of the occurrence of yellow fever, particularly around the southern border of the endemic zone. In Brazil, favorable reports of the *Aedes aegypti* eradication program with DDT indicate that the mosquito will have been wiped out of the country before the end of the present year. It has already disappeared completely from all ports and cities and is found only in a small rural area in the northeastern part.

—ANNOUNCEMENTS—

Seminar on Plumbing Problems

The University of Michigan School of Public Health will give its second in-service, noncredit training course in plumbing problems September 15 and 16 at Ann Arbor.

Applications for enrollment in the course should be submitted to H. E. Miller of the School of Public Health, 109 South Observatory Street. The enrollment fee is $5.00.

The course is designed especially for the benefit of plumbers, architects, engineers, and sanitarians, but any interested persons will be accepted.

The first day will be given to the theory and practice of hydraulic principles, to safety devices and safety precautions, and to protective equipment for the water system. The second day, in addition to plumbing problems involved in the disposal of wastes and to the fundamentals governing septic tank design and installation, a national plumbing code will be discussed and a movie based on the code will be shown.

Course in Diseases of the Endocrines

Michael Reese Hospital Postgraduate School offers a course in Diseases of the Endocrines, Physiology and Diagnostic Methods. The class will meet from September 18 through September 29, 1950, and will be under the direction of Dr. Rachmiel Levine, Director of the Department of Metabolic and Endocrine Research. The course will consist of a balanced program of lectures and case demonstrations. Tuition is $100. For further information and a detailed schedule, address: Dr. Samuel Soskin, Dean, Michael Reese Hospital Postgraduate School, 29th St. & Ellis Ave., Chicago 16, Illinois.

Incidence of Disease

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

Reports from States for Week Ended July 22, 1950

New cases of acute poliomyelitis reported in the Nation for the current week numbered 827; an increase over the 664 cases reported for the preceding week. However, the number was lower than the 1,440 cases reported for the corresponding period last year. The cumulative total (4,017) for the current "disease" year was below the corresponding total (5,408) for last year, the highest year on record. The "disease" year for acute poliomyelitis begins with the twelfth week of the calendar year.

For the current week, all geographic divisions except two showed increases over the preceding week. These increases ranged from 11 (11 to 22) cases reported in the Mountain States to 44 (117 to 161) cases in the South Atlantic States. Texas reported the largest num-

Comparative Data for Cases of Specified Reportable Diseases: United States

[Numbers after diseases are International List numbers, 1948 revision]

Disease	Total for week ended		5-year median 1945-49	Seasonal low week	Cumulative total since seasonal low week		5-year median 1944-45 through 1948-49	Cumulative total for calendar year		5-year median 1945-49
	July 22, 1950	July 23, 1949			1949-50	1948-49		1950	1949	
Anthrax (062)	1	- -	(1)	(1)	(1)	(1)	(1)	27	33	(1)
Diphtheria (055)	63	100	113	27th	123	184	251	3,251	3,952	6,548
Acute infectious encephalitis (082)	23	10	12	(1)	(1)	(1)	(1)	421	299	264
Influenza (480-483)	518	356	492	30th	276,275	111,739	181,682	245,745	75,469	138,124
Measles (085)	3,418	2,941	2,911	35th	209,082	634,264	574,526	279,952	581,871	539,597
Meningococcal meningitis (057.0)	50	49	54	37th	[2] 3,363	2,990	3,248	[2] 2,450	2,146	2,276
Pneumonia (490-493)	662	736	------ --	(1)	(1)	(1)	-- -----	57,772	52,495	-- -----
Acute poliomyelitis (080)	827	1,440	666	11th	[3] 4,017	5,408	2,789	[3] 5,151	6,323	3,256
Rocky Mountain spotted fever (104)	21	32	32	(1)	(1)	(1)	(1)	236	307	260
Scarlet fever (050)	316	238	555	32d	55,818	79,517	87,417	39,379	56,973	60,731
Smallpox (084)	-------	-------	1	35th	43	49	195	23	39	141
Tularemia (059)	22	27	24	(1)	(1)	(1)	(1)	568	703	592
Typhoid and paratyphoid fever (040, 041) [4]	100	112	109	11th	1,186	1,199	1,280	1,696	1,687	1,753
Whooping cough (056)	2,468	1,650	2,245	39th	98,106	41,851	84,652	76,570	31,818	55,284

[1] Not computed. [2] Arkansas: deduction week ended July 15, 1 case. [3] New Mexico: deductions weeks ended May 27, June 3 and 24, 1 case each. North Carolina: week ended July 15, 1 case. [4] Including cases reported as salmonellosis.

ber of cases (111); Virginia, the second highest (76); and New York, the third (64).

The total number of cases of influenza reported for the current week was 518, compared with 356 for the corresponding period last year. The cumulative total for the "disease" year (beginning with the 31st week, 1949) was 276,275 reported cases of influenza. The 5-year median was 181,682.

The number of cases of acute infectious encephalitis reported for the week was 23, an increase from the 17 cases reported for the preceding week. For the corresponding week last year 10 cases were reported. The cumulative total for the current calendar year was 421 which may be compared with the corresponding figure of 299 for 1949 and 264 for the 5-year median.

The total number of cases of whooping cough reported in the Nation for the current week was 2,468 compared with 2,363 cases last week. For the corresponding week last year, 1,650 cases were reported. The cumulative total for the "disease" year to date was 98,106 compared with 41,851 cases reported for the corresponding period last year and 84,652 cases, the 5-year median. The "disease" year for whooping cough begins with the 40th week of the calendar year.

The total number of cases of diphtheria reported for the current week was 63, the lowest total for the corresponding week in the past 5 years. The cumulative total for the current calendar year is 3,251 cases, the lowest total number reported for the corresponding period during the past 5 years.

One case of anthrax was reported in Pennsylvania. One case of psittacosis was reported in Louisiana. No cases of smallpox were reported in the United States.

Deaths During Week Ended July 22, 1950

	Week ended July 22, 1950	*Corresponding week, 1949*
Data for 93 large cities of the United States:		
Total deaths	8, 116	8, 184
Median for 3 prior years	8, 086	----------
Total deaths, first 29 weeks of year	272, 383	270, 704
Deaths under 1 year of age	649	575
Median for 3 prior years	625	----------
Deaths under 1 year of age, first 29 weeks of year	17, 953	18, 602
Data from industrial insurance companies:		
Policies in force	69, 683, 374	70, 320, 074
Number of death claims	11, 673	12, 188
Death claims per 1,000 policies in force, annual rate	8. 7	9. 0
Death claims per 1,000 policies, first 29 weeks of year, annual rate	9. 6	9. 4

Reported Cases of Selected Communicable Diseases: United States, Week Ended July 22, 1950

[Numbers under diseases are International List numbers, 1948 revision]

Area	Diphtheria (055)	Encephalitis, infectious (082)	Influenza (480–483)	Measles (085)	Meningitis, meningococcal (057.0)	Pneumonia (490–493)	Poliomyelitis (080)
United States	**63**	**23**	**518**	**3,418**	**50**	**662**	**827**
New England	**2**	**1**	----	**334**	**2**	**22**	**14**
Maine	----	----	----	4	----	3	1
New Hampshire	----	----	----	4	----	----	----
Vermont	----	----	----	7	----	----	2
Massachusetts	1	1	----	255	----	----	7
Rhode Island	1	----	----	1	----	----	----
Connecticut	----	----	----	63	2	19	4
Middle Atlantic	**1**	**6**	----	**1,065**	**6**	**195**	**93**
New York	1	3	([1])	514	2	104	64
New Jersey	----	3	----	350	1	35	12
Pennsylvania	----	----	----	201	3	56	17
East North Central	**9**	**5**	**9**	**1,025**	**8**	**68**	**113**
Ohio	3	1	1	170	1	20	30
Indiana	----	----	----	35	1	7	10
Illinois	2	1	1	288	2	27	45
Michigan	3	3	1	154	1	11	18
Wisconsin	1	----	6	378	3	3	10
West North Central	**4**	**3**	**1**	**113**	**6**	**24**	**91**
Minnesota	1	----	----	32	----	10	8
Iowa	----	----	----	24	1	----	42
Missouri	----	----	----	31	1	6	7
North Dakota	----	3	----	----	1	8	----
South Dakota	----	----	----	2	----	----	4
Nebraska	----	----	----	17	1	3	11
Kansas	3	----	1	7	2	2	19
South Atlantic	**19**	----	**111**	**183**	**5**	**61**	**161**
Delaware	----	----	----	10	----	----	----
Maryland	1	----	2	18	1	12	3
District of Columbia	----	----	----	5	----	12	8
Virginia	----	----	77	47	----	19	76
West Virginia	5	----	23	58	2	1	11
North Carolina	9	----	----	10	1	----	22
South Carolina	----	----	6	----	----	3	22
Georgia	3	----	2	16	----	7	14
Florida	1	----	1	13	1	7	5
East South Central	**7**	**1**	**5**	**65**	**8**	**50**	**105**
Kentucky	2		1	24	1	14	40
Tennessee	1		1	26	5	----	21
Alabama	1	1	2	11	2	18	16
Mississippi	3		1	4	----	18	28
West South Central	**16**		**350**	**145**	**11**	**184**	**163**
Arkansas			18	11	----	6	18
Louisiana	3		----	3	2	22	21
Oklahoma	3		10	5	----	4	13
Texas	10		322	126	9	152	111
Mountain	**4**	**1**	**39**	**203**	**1**	**17**	**22**
Montana	----	----	5	9	----	1	1
Idaho	----	----	5	70	----	----	----
Wyoming	----	----	----	2	----	----	7
Colorado	2	1	5	63	----	5	7
New Mexico	----	----	1	9	----	2	7
Arizona	2	----	23	15	1	6	----
Utah	----	----	----	35	----	3	----
Nevada	----	----	----	----	----	----	----
Pacific	**1**	**6**	**3**	**285**	**3**	**41**	**65**
Washington	----	----	----	16	----	2	8
Oregon	1	----	2	15	----	4	3
California	----	6	1	254	3	35	54
Alaska	----	----	----	----	----	----	----
Hawaii	----	----	----	5	----	----	----

[1] New York City only.

Anthrax: Pennsylvania, 1 case.

Reported Cases of Selected Communicable Diseases: United States, Week Ended July 22, 1950—Continued

[Numbers under diseases are International List numbers, 1948 revision]

Area	Rocky Mountain spotted fever (104)	Scarlet fever (050)	Smallpox (084)	Tularemia (059)	Typhoid and para-typhoid fever (040,041) [1]	Whooping cough (056)	Rabies in animals
United States	**21**	**316**		**22**	**100**	**2,468**	**114**
New England		**41**			**3**	**266**	
Maine						46	
New Hampshire		1				3	
Vermont		2				16	
Massachusetts		33			3	112	
Rhode Island						26	
Connecticut		5				63	
Middle Atlantic	**2**	**56**			**11**	**294**	**24**
New York	1	[2] 37			3	119	23
New Jersey		7			4	94	
Pennsylvania	1	12			4	81	1
East North Central	**1**	**83**		**1**	**8**	**562**	**20**
Ohio		33			3	140	6
Indiana		5			1	29	9
Illinois	1	7		1	1	111	
Michigan		25			1	158	4
Wisconsin		13			2	124	1
West North Central	**1**	**14**		**2**	**2**	**172**	**12**
Minnesota		2		1		34	
Iowa		3				54	12
Missouri	1	1			2	37	
North Dakota		2		1		9	
South Dakota						2	
Nebraska		5				4	
Kansas		1				32	
South Atlantic	**11**	**19**		**2**	**15**	**354**	**11**
Delaware						2	
Maryland	2	2			1	29	
District of Columbia					1	5	
Virginia	5	4		1	3	133	1
West Virginia		2			2	51	
North Carolina	4	10			4	90	
South Carolina					4	12	3
Georgia						17	7
Florida		1		1		15	
East South Central	**2**	**36**		**1**	**21**	**124**	**26**
Kentucky		15			11	24	15
Tennessee	1	16			4	67	5
Alabama	1	2			5	28	3
Mississippi		3		1	1	5	3
West South Central	**1**	**15**		**14**	**20**	**393**	**18**
Arkansas		2		13	5	33	1
Louisiana	1				2	4	
Oklahoma		4		1	3	22	1
Texas		9			19	334	16
Mountain	**3**	**6**		**1**	**1**	**90**	**1**
Montana						8	
Idaho	2	3				6	
Wyoming						1	
Colorado		2				20	1
New Mexico							
Arizona		1			1	41	
Utah	1			1		14	
Nevada							
Pacific		**46**		**1**	**10**	**213**	**2**
Washington		2				64	
Oregon		1		1	1	35	
California		43			9	114	2
Alaska		1			1		
Hawaii							

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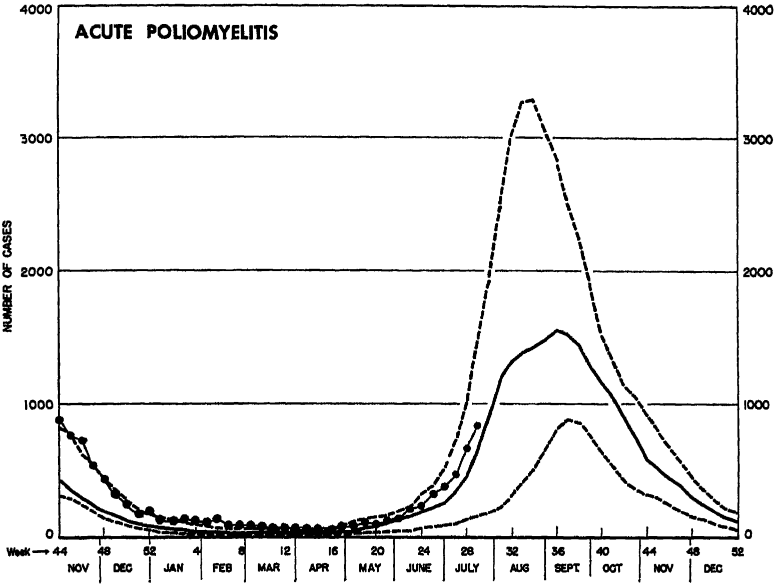
[1] Including cases reported as salmonellosis.

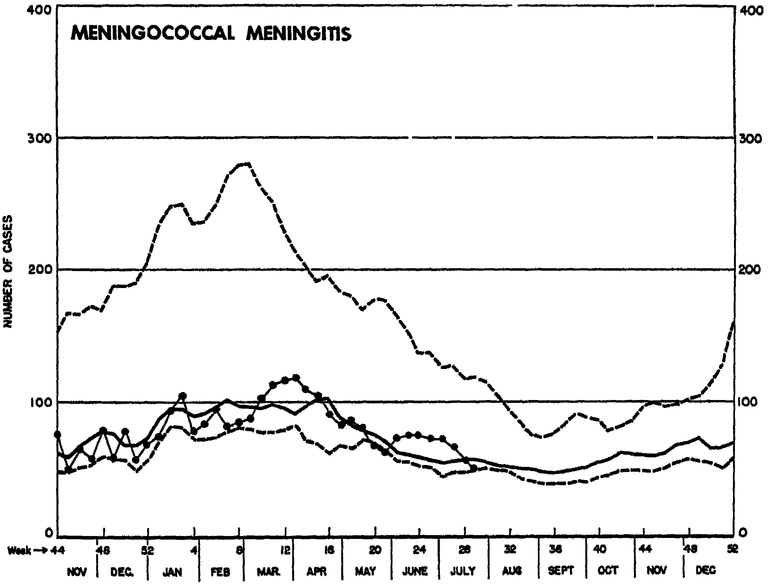
[2] Including cases reported as streptococcal sore throat.

Psittacosis: Louisiana, 1 case.

Communicable Disease Charts

All reporting States, November 1949 through July 22, 1950





The upper and lower broken lines represent the highest and lowest figures recorded for the corresponding weeks in the 5 preceding years. The solid line is a median figure for the 5 preceding years. All three lines have been smoothed by a 3-week moving average. The dots represent numbers of cases reported for the weeks 1949–50

FOREIGN REPORTS

CANADA

Reported Cases of Certain Diseases—Week Ended July 1, 1950

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Brucellosis	-----	-----	-----	-----	2	5	-----	-----	-----	1	8
Chickenpox	-----	-----	15	1	65	197	19	18	79	98	492
Diphtheria	-----	-----	-----	-----	5	2	-----	-----	1	-----	8
Dysentery:											
Amebic	-----	-----	-----	-----	-----	1	-----	-----	-----	-----	1
Bacillary	-----	-----	-----	-----	4	1	2	-----	-----	3	10
Encephalitis, infectious	-----	-----	-----	-----	-----	-----	-----	-----	1	-----	1
German measles	-----	-----	11	-----	1	498	-----	80	117	224	931
Influenza	-----	-----	4	-----	-----	6	1	-----	-----	-----	11
Measles	-----	-----	3	-----	125	501	26	16	12	110	793
Meningitis, meningococcal	-----	-----	-----	-----	-----	3	-----	1	-----	-----	4
Mumps	-----	-----	18	-----	48	270	10	56	101	88	591
Poliomyelitis	-----	-----	-----	-----	-----	4	-----	-----	-----	2	6
Scarlet fever	4	-----	1	1	33	18	1	7	40	4	109
Tuberculosis (all forms)	13	-----	2	27	126	38	11	17	-----	26	260
Typhoid and paratyphoid fever	-----	-----	-----	-----	12	1	2	-----	1	3	19
Venereal diseases:											
Gonorrhea	5	-----	13	6	109	53	25	26	32	57	326
Syphilis	3	-----	12	6	49	17	8	5	3	7	110
Other forms	-----	-----	-----	-----	-----	-----	-----	1	-----	-----	1
Whooping cough	2	-----	4	-----	57	56	-----	3	3	54	179

CUBA

Reported Cases of Certain Diseases—4 Weeks Ended June 24, 1950

Disease	Pinar del Rio	Habana		Matanzas	Santa Clara	Camaguey	Oriente	Total
		Habana City	Total					
Cancer	7	-----	14	17	10	2	21	71
Chickenpox	-----	15	16	4	1	3	2	26
Diphtheria	-----	4	6	1	1	-----	1	9
Leprosy	2	-----	2	-----	-----	3	1	8
Malaria	-----	4	4	-----	-----	-----	7	11
Measles	-----	-----	-----	2	1	-----	4	7
Poliomyelitis	-----	2	2	-----	-----	-----	1	3
Tuberculosis	5	-----	9	5	8	14	21	62
Typhoid fever	3	9	16	3	13	3	33	71
Whooping cough	-----	-----	8	-----	-----	-----	-----	8

NORWAY

Reported Cases of Certain Diseases—April 1950

Disease	Cases	Disease	Cases
Diphtheria	39	Pneumonia (all forms)	2,949
Erysipelas	296	Poliomyelitis	6
Gastroenteritis	2,401	Rheumatic fever	127
Hepatitis, infectious	67	Scabies	937
Impetigo contagiosa	1,478	Scarlet fever	149
Influenza	2,681	Tuberculosis (all forms)	303
Malaria	1	Typhoid fever	1
Measles	732	Venereal diseases:	
Meningitis, meningococcal	12	Gonorrhea	201
Mumps	235	Syphilis	59
Paratyphoid fever	4	Whooping cough	2,829

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

Burma. During the week ended July 8, 1950, 66 cases of cholera, with 53 deaths, were reported in Burma.

India. In Calcutta, 197 cases of cholera were reported for the week ended July 8, 1950, and 180 cases for the week ended July 15. New Delhi reported 20 cases for the week ended July 8, and 7 cases for the week ended July 15.

Plague

Belgian Congo. During the week ended July 8, 1950, one fatal case of plague was reported in Goto, a village in Stanleyville Province, northeast of Blukwa.

Ecuador. During the month of May 1950, four cases of plague (one fatal) were reported in Chimborazo Province, as follows: In Malobog, Licto Parish, Riobamba County, two cases, one death; and in Shio, Chambo Parish, two cases.

Indochina (French). During the week ended July 8, 1950, three cases of plague were reported in the port town of Phanthiet, Viet Nam.

Peru. During the month of March 1950, plague was reported in Peru as follows: In Aija Province, Ancash Department, three cases; in Chancay Province, Lima Department, two cases, one fatal.

Smallpox

Gold Coast. On July 8, 1950, 61 cases of smallpox were reported in Gold Coast. The period for which the report was made was not stated.

India. During the week ended July 8, 1950, 78 cases of smallpox were reported in Calcutta and 95 in Madrid.

Indonesia. For the week ended July 8, 1950, 184 cases of smallpox were reported in Surabaya, Java.

Typhus Fever

Spain. Typhus fever has been reported in Spain as follows: Week ended June 3, 1950, one case in Granada Province; week ended June 10, two cases in Malaga Province.

Yellow Fever

Brazil. On April 3, 1950, one death from yellow fever was reported in Colinas, Maranhao State.

* * *

The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

The Public Health Reports, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The Public Health Reports is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the Public Health Reports, reprints, or supplements should be addressed to the Surgeon General, Public Health Service, Washington 25, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington 25, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

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24 OCT 1950

Public Health Reports

VOLUME 65 AUGUST 18, 1950 NUMBER 33

IN THIS ISSUE

Bactericidal Efficiency of Q. A. C.
Haplomycosis in Montana Mammals
Milk Sanitation Ratings

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

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Bactericidal Efficiency of Quaternary Ammonium Compounds

By C. T. Butterfield, Elsie Wattie, and C. W. Chambers*

A widespread public health interest in bactericidal agents has developed during the past 50 years. This interest centers particularly on the disinfection of multiple-use eating and drinking utensils in the field of restaurant and hotel sanitation. Official action by the United States Public Health Service in this regard was reported in 1943 in the Ordinance and Code (*1*) recommended for the regulation of eating and drinking establishments. This Public Health Service Ordinance and Code provides for approved bactericidal processes for the disinfection of multiple-service utensils as follows: (a) exposure in water at a temperature of at least 170° F. for at least 2 minutes, or for ½ minute in boiling water; (b) immersion in a lukewarm chlorine bath (hypochlorite) containing at least 50 ppm of uncombined available chlorine for at least 2 minutes, or a concentration of equal bactericidal strength if combined chlorine compounds (chloramines) are used; (c) exposure to steam of at least 170° F. for at least 15 minutes, or at 200° F. for at least 5 minutes, or (d) exposure to a hot air temperature of at least 180° F. for at least 20 minutes. All of these procedures must be carried out under the conditions specified to meet the requirements for each.

Under (b) the Ordinance and Code also provides for the use of chemical bactericidal agents other than chlorine with the following specifications:

1. The health officer concerned must determine that the substituted agent is satisfactory.
2. The concentration of the bactericidal agent must be measurable by a simple and accurate field test.

Suitable compliance with these two requirements is essential if satisfactory results are to be obtained.

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Probably no one will disagree with the statement that exposure to heat, particularly immersion in boiling water, is a more reliable method for disinfecting multiple-service utensils. It is believed that it is the only procedure which will quickly kill pathogenic acid-fast bacteria. However, in many installations, it is not feasible or practicable to provide hot water or heat for the disinfection of utensils. Moreover, in many instances, objection has been made to the use of chlorine on the ground that disagreeable odors are produced which are annoying to employee and customer alike. Under such conditions, evasion of the use, or inadequate use, of chlorine or its compounds may follow. For these and other reasons, the advent of quaternary ammonium compounds for use as bactericidal agents appeared to be a welcome addition to the field. The urge to use quaternary ammonium compounds has increased concurrently with the rapid development in the commercial production, recommendation, and distribution of these compounds.

Fuchs (*2*) in 1947 reviewed the restaurant sanitation program of the Public Health Service and indicated that the Bacteriology Section of the Environmental Health Center at Cincinnati was engaged in a basic study of the bactericidal efficiency of quaternary ammonium compounds (Q.A.C.). The bactericidal action of certain Q.A.C. was reported by Jacobs (*3*) in 1916. Since then a considerable number of articles, pertaining to the Q.A.C., their bactericidal properties, and the factors which affect the latter, have been published. This literature has been adequately reviewed by Rahn and Van Eseltine (*4*). The reader is referred to their article for a more complete discussion of these compounds and their properties. This review definitely indicates the need for more satisfactory laboratory methods for the determination of the bactericidal efficiency of these compounds when they are used in natural waters.

It was natural that the phenol coefficient method of testing disinfectants should be the method of choice in testing the Q.A.C. as they were used first in the medical and surgical field. Such preparations are normally made in distilled water, and the phenol coefficient procedure would produce results of considerable comparative value. In the field of use considered here, however, the operating rather than the comparative efficiency of a disinfectant is of primary concern. When the Q.A.C. are used in natural waters of widely varying composition where inhibiting factors may be involved results obtained with the phenol coefficient test may not constitute an adequate criterion. Klarmann and Wright (*5*, *6*) in studying their own products by the phenol coefficient method found that this procedure tended to show greater bactericidal efficiencies than were observed in practical use. Kolmer and Boerner (*7*) in concluding their discussion of the phenol coefficient test in their text state: "Other groups of disinfectants in common use, for which the phenol coefficient method of testing is not well adapted, are those compounds containing chlorine as the active agent as well as oxidizing agents in general. These are affected so materially by the presence of organic matter that a phenol coefficient statement may grossly misrepresent their value under practical conditions of use, and is very apt to be misleading to the consumer when placed on the label." At best, the phenol coefficient test can give only a relative value of the bactericidal efficiency of a disinfectant under standardized conditions in mixtures of broth and distilled water. It often provides little or no information concerning bactericidal action under conditions of practical use.

The available evidence tends to provide the reasons for the failure of this method of testing the Q.A.C. The bactericidal action of the Q.A.C. is adversely affected by fats and proteins with which they combine, and they are inactivated by soaps, lecithin, and many other substances. This evidence also indicates that if the Q.A.C. are to be used for the disinfection of multiple-service utensils: (1) the utensils must be clean, i.e., free from interfering substances at the time of exposure, and (2) the cumulative effect of small amounts of interfering substances, soaps, etc., carried over into the bactericidal rinses should be considered.

In this study of the bactericidal properties of the Q.A.C., various test methods described in the literature were investigated in addition to the phenol coefficient procedure. A testing method developed at the Environmental Health Center for observations on the bactericidal properties of chlorine (*8*) and chloramines (*9*), which had proved to be very effective, was also included. A modification of this latter procedure was found to be a most effective method for the determination of the bactericidal properties of the Q.A.C. This modification, which will be described in detail, was developed to approximate the actual conditions under which the compounds would be used in practice.

Escherichia coli was selected as the test organism for this study. It would have been desirable to use a variety of test organisms, pathogenic as well as saprophytic, but the volume of work required in investigating the bactericidal efficiency of a very considerable number of Q.A.C. did not permit this. The selection of *E. coli* was based on evidence in the literature which indicated that this organism occupied an intermediate position in its susceptibility to the Q.A.C. It is more resistant than any species of *Streptococcus* or *Staphylococcus* tested, and less resistant than the *Pseudomonas* or *Mycobacterium tuberculosis*. A high resistance of the latter organism would be anticipated as it is very resistant to all processes of chemical disinfection including the use of free chlorine.

In practice, Q.A.C. solutions would be made in the available tap water. Consequently, in exploratory tests a wide variety of waters were used for the preparation of the solutions of the Q.A.C. under examination. These included distilled water, phosphate buffered distilled water, and tap waters from 10 municipalities. The sources of these tap waters were surface supplies (river and impounded), spring waters, and deep and shallow well supplies. As a result of the information obtained from these data, Cincinnati tap water was selected as representative of an average surface supply and Norwood (Ohio) tap water as an average moderately deep well supply. These two tap waters and buffered distilled water, as a control, were used in the majority of the tests reported at this time.

The standard test portion of water used in this study was 500 ml. in a one-liter flask. This volume provided for (1) rapid and adequate mixing; (2) an ample quantity of sample to permit withdrawal of portions not only for bacterial tests at the various intervals of examination but also for chemical determinations of pH, residual Q.A.C., etc., and (3) protection from temperature changes of the sample, induced by handling, during the period of the test. Temperature changes might alter the course of the bactericidal action. For bacterial examinations only, a lesser sample volume might be used if the necessary precautions were observed. Weber and Black *(11)*, after the data for this report had been completed, described such a procedure for bactericidal tests using small amounts of sample.

In bactericidal tests it is essential that the action of the bactericide be stopped exactly at the designated time. In the earlier studies *(8, 9)* with chlorine and chloramines, this was accomplished by withdrawing portions from the test flasks and discharging these portions at the right time intervals into a measured volume of inhibitor solution which immediately neutralized all chlorine or chloramine present. In preliminary tests on inhibitors of the bactericidal activity of the Q.A.C., it was found that standard Castile soap solutions in low concentrations effectively neutralized their bactericidal action on *E. coli*. It was also found that standard nutrient agar with its organic ingredients would instantaneously neutralize the bactericidal properties of the Q.A.C. for *E. coli* if the dilution of the agar with the solution was kept within reasonable limits. Consequently, in the tests reported at this time the bactericidal action was inhibited by withdrawing 1 and 2 ml. portions of the sample under examination and discharging them into sterile Petri dishes a few seconds before the exposure interval was complete. Then at the correct interval 10 to 15 ml. of standard nutrient agar was poured into the plate directly on the sample portions, rapidly mixed, and congealed. The data obtained indicated that this procedure gave very satisfactory results. If any error was introduced by this method of inhibition, such error would tend to favor the bactericidal potency of the compounds under test.

Methods

Preparation of Glassware

To avoid the possibility of difficulties induced by extraneous materials or organisms, all glassware used in these tests was made clean chemically by treating with acid cleaning solution, rinsing thoroughly with tap and distilled water, draining dry, and sterilizing by exposure to hot air at 180° C. for 2 hours.

Preparation of Bacterial Suspensions

A laboratory strain of *E. coli* (culture No. 198 recently isolated from feces) was used throughout this study. The bacterial suspension was prepared by washing the growth from the entire surface of a standard agar slant which had been inoculated with a young culture and incubated for 20 to 24 hours at 37° C. The growth was washed off aseptically with 2 ml. of sterile phosphate buffered dilution water after which the water containing the culture was returned to the dilution bottle. This bacterial suspension of 99 ml. was shaken vigorously and allowed to stand quiescent for about 10 minutes. An appropriate amount (usually 0.35 ml.) from the supernatant of this suspension was then transferred to a second 99 ml. dilution bottle and again shaken vigorously. By an "appropriate amount" is meant that quantity which, when added to the second dilution bottle, would give a bacterial population in this bottle of about 800,000 per ml. A 1 ml. portion from the second dilution bottle was then added to each test flask containing 500 ml. of the test water, or test water plus bactericidal agent. This method provided a bacterial population of 1,000 to 2,000 per ml. usually about 1,600 per ml. in each flask. The use of such a density, though convenient for the test, might be a less severe procedure for the bactericide than the use of much larger numbers.

Types of Water

As noted, three types of water were selected for use in these studies: (1) distilled water buffered with Clark and Lubs standard phosphate buffer solutions at pH ranges of 7.0 to 9.5; (2) Cincinnati tap water; and (3) Norwood (Ohio) tap water. Tap waters were not sterilized prior to use as this would not occur in practice, and it had been determined in the preliminary work that such sterilization frequently altered the effect of the water on the bactericidal agents subsequently introduced. If the natural tap waters contained any residual chlorine, either free or combined, this was neutralized by the addition of an appropriate amount of sterile N/10 sodium thiosulphate solution. Difficulties incident to the presence of bacteria in the unsterilized tap waters were not encountered as these waters were relatively free of bacteria.

Preparation of Q.A.C. Solutions

Commercial sanitizers were used as put up by the producer. The amount of Q.A.C. present in the dilutions was calculated in parts per million (ppm) on the basis of the amount stated on the label. Solutions of pure Q.A.C. were prepared in distilled water in concentrations corresponding to those given for commercial sanitizers. In initial tests on the bactericidal efficiency of each preparation, the test concentrations were varied within the concentration range recommended for use by the producer. That is, if the producer specified a concentration of 150 ppm, test portions would be made containing 25, 50, 100, 150, 200, and 300 ppm. Concentrations used in subsequently repeated series with the same product would be governed by the results obtained in the initial exploratory tests.

Determinations of Residual Q.A.C.

No attempt was made to develop a test, or tests, for residual Q.A.C. However, tests for residuals were made using 11 commercial test kits which were available on the market. The results obtained with these test kits will be discussed.

Hydrogen-ion Concentration

The hydrogen-ion concentrations of the waters used and of the mixtures of water, bactericidal agent, and bacterial cells were always determined by electrometric methods. The initial pH of the waters could be determined colorimetrically. However, the Q.A.C. interfered with the indicator dyes to such an extent that colorimetric pH determinations were usually unsatisfactory after any of these compounds had been added to the water.

Bacterial Counts

Quantitative determinations of the number of bacteria per ml. in the control portions and of surviving bacteria in test portions after various periods of exposure were made by agar plate counts following the procedures given in Standard Methods (*10*). The only exception to this procedure was that triplicate plates were planted at each dilution instead of duplicate plates. Colonies on plates were counted, using a Quebec Colony Counter, after 24-hours incubation at 37° C. At the inception of the study and at frequent intervals thereafter plates were incubated for longer periods, 48 to 96 hours, to determine if additional colonies might develop. In no instance was any increase in the number of colonies observed. To establish the identity of surviving organisms, isolations were made on standard lactose broth from plates showing a minimum of growth. All colonies on such plates were picked for identification. The colonies selected for study represented the bacteria which had survived the longest exposure time. Contaminations by air borne bacteria were encountered only rarely and control tests excluded *E. coli* as a contaminant in all such cases. The sterility of Petri dishes, pipettes, water, and agar used in each series was carefully controlled.

Criterion of Satisfactory Disinfection

E. coli was selected as the test organism for this study for reasons which have been given. For purposes of safety, a 100 percent kill of *E. coli* in 1 minute was set as a tentative standard for safe disinfection. The Ordinance and Code (*1*) provides for an exposure time of 2 minutes when such bactericidal agents are to be used. An exposure period of 2 minutes probably exceeds the time that is ordinarily provided in actual operations, particularly during "rush" hours, when the conditions which prevail in hotels, restaurants, and bars are considered. Consequently, it is believed that the 1 minute exposure, with a 100 percent kill, set as the standard criterion for this study, is not too brief an interval; perhaps a shorter interval of 15 or 30 seconds might be desirable under existing conditions.

Tests

In this study, 570 series of tests have been made in addition to a considerable number of preliminary exploratory experiments. The methods, materials, and equipment described here were used. A "series" consisted of repeated observations on several test portions of water, usually eight. In a series, 500 ml. portions of tap waters (or other water used) were added to each of eight sterile 1-liter Erlenmeyer flasks. Flask 1, subjected to the same handling and treatment as the remaining flasks, was used as a temperature control. Flask 2, also a control, contained test water only, received no Q.A.C. solution, and was used to determine the bacterial behavior in the water under test. To the third and all succeeding flasks, increasing amounts (expressed in ppm of active agent) of the Q.A.C. under test were added. One ml. portions of bacterial suspension were then introduced into all flasks at appropriate intervals. "Appropriate interval" means that additions of bacteria to each succeeding flask were made with such intervening time periods that subsequent examinations of the various test portions at the indicated times could be made without conflict. Coincident with the addition of the bacteria, vigorous mixing was started and continued for 30 seconds. Routine bacterial plate counts were made after 1-, 2-, and 5-minute periods of exposure, with occasional examinations after 10, 30, and 60 minutes. The hydrogen-ion concentration of each water was determined for each series and for each test portion at the end of each series. Tests for residual Q.A.C. in which available commercial test kits were used were made frequently on each test portion at the end of a run.

Results

In the 570 series of tests, 40 commercial sanitizers containing Q.A.C. as the bactericidal agent were included. Eleven chemically different types of Q.A.C. were represented as active agents in this group. Several of these Q.A.C. in pure form (filler-free) were included in this study. The 570 series required the examination of approximately 20,000 bacteriological samples in addition to the examinations of the preliminary tests and the identification of surviving bacteria. It is not practicable to present all of the data in detail and no attempt is made to do so. Presentation of the data is confined to averaged results showing the reproducible nature, or reliability, of the testing procedure used and to summaries illustrating the factors which were found to affect the bactericidal efficiency of these compounds. Also, the effectiveness of available test procedures for the determination of residual Q.A.C. is discussed.

Duplicability of Procedure

The all-important characteristic of any test procedure is that it be reliable. Repeated examinations of the same sample should produce results which are in reasonable agreement. In conducting tests in which many variable factors are involved, it is essential to standardize or eliminate variables in so far as possible in order to determine the reliability of the testing procedure.

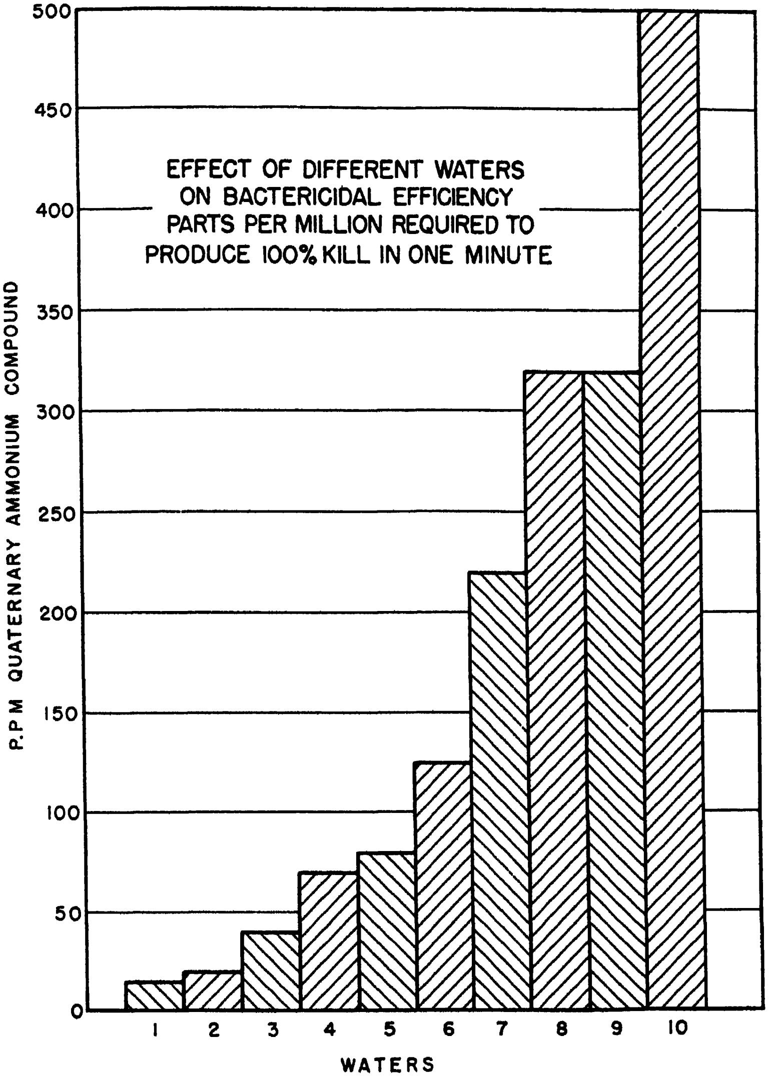
Table 1. *Results obtained in repeated tests of 2 compounds in Cincinnati tap water, using the described procedures*

Compound tested	Test number	Parts per million of active agent required to obtain a 100-percent kill		
		1 minute	*2 minutes*	*5 minutes*
I	1	150	100	50
I	2	150	100	50
I	3	150	100	50
I	4	100	75	50
P	1	125	100	75
P	2	125	100	50
P	3	125	100	50

In table 1 the results of repeated examinations on the bactericidal efficiency of two widely used quaternary ammonium compounds are presented. In these tests aliquots of the same water were used for each experiment, and the pH and the temperature were kept constant. It may be noted that for compound I the maximum variations observed were 33, 25 and 0 percent, respectively, for the 1-, 2-, and 5-minute periods of exposure; for compound P the maximum variation was also 33 percent. Such variations are well within the limits of the probable error of such bacterial determinations, and they were much less than the variations with other test procedures investigated. Moreover, these variations are very much less than the safety factors (twofold to fiftyfold) usually required for the use of such disinfecting agents. It is believed that this test procedure gives a reliable measure of the bactericidal efficiency of these compounds.

Effect of Water on Bactericidal Efficiency

In selecting standard test waters for this study, 10 waters were investigated. One of the more widely used quaternary ammonium compounds was the bactericidal agent employed. The results are shown in the chart.



Waters 1, 2, and 3 were distilled water buffered at pH 8.0, 7.0, and 6.6, respectively, with Clark and Lubs phosphate buffers. The other waters were: 4, Wyoming (Ohio) drilled well supply; 5, Harrison (Ohio) drilled well supply; 6, Cincinnati, treated Ohio river water; 7, Norwood (Ohio) well supply; 8, Lebanon (Ohio) drilled well supply; 9, Lawrenceburg (Indiana) tubular well supply; and 10, Cincinnati, tap to which a trace of sodium borate was added.

The amount of active agent required to produce a 100 percent kill of *E. coli* in 1 minute in these waters varied from 15 to 500 ppm. Five waters required less than, and five more than, 100 ppm. The average ppm of Q.A.C. required was 170. Waters 6 and 7, Cincinnati tap water (a representative river supply), and Norwood tap water (a representative well water) which were selected as the test waters for this study, required, respectively, 125 and 220 ppm of this active agent. As the requirement for these waters was approximately 30 percent less than, and 30 percent more than, respectively, the average amount required for all waters investigated, it was considered that they would be appropriate for use as standard test waters.

In this connection it should be noted that synthetic waters simulating these natural waters in their chemical constituents were investigated for use as possible test waters. No combinations of chemical constituents in distilled water were found which would reproduce consistently the results obtained with natural waters. Moreover, any modification of the natural water, such as boiling, autoclaving, filtration, etc., invariably, materially altered the degree to which this water affected the bactericidal efficiency of the Q.A.C. under test. This effect was observed even though no change in pH occurred and no visible precipitation was noted in the waters under treatment. This leads to the conclusion that the bactericidal efficiency of these compounds is markedly affected by constituents of natural waters other than the *chemical constituents usually determined.* Consequently, any opinion regarding the factors affecting bactericidal efficiency of these compounds based on such partial information would be unsound and probably misleading.

Relative Efficiency of Various Q.A.C.

In table 2 results obtained with 15 Q.A.C. sanitizers in synthetic, Cincinnati and Norwood tap waters are presented. Of the 15 representative compounds, 4 were pure, unadulterated with either filler or diluent, and 1, designated T, was a combined detergent-sanitizer, made up from the combination of a detergent and a sanitizing agent, each of which was better than average for its purpose when tested independently. The results obtained with T are included in the

Table 2. *Effect of water on the bactericidal efficiency of quaternary ammonium compounds dissolved therein*

Active agent* designation	Results obtained at room temperature in waters indicated									Ppm. recommended for use by producer
	Buffered distilled			Cincinnati tap			Norwood tap			
	Ppm. required to produce a 100 percent kill in following minutes									
	1	2	5	1	2	5	1	2	5	
1	100	75	50	300	300	200	500	400	300	------
2	75	50	25	300	125	100	300	225	150	------
5	40	30	20	150	80	40	200	150	100	150
A	40	------	20	175	------	100	300	200	150	264
D	50	------	------	200	200	100	300	160	120	158
I	30	20	10	100	70	50	250	175	125	234
L	75	50	25	600	300	200	800	400	------	188
M	30	----	10	200	150	100	300	225	200	------
P	40	30	10	125	100	100	220	120	80	150
S	30	20	10	90	80	40	300	200	------	192
T	30	30	5	500	400	400	15,000+	15,000+	15,000+	------
U	10	------	2.5	100	80	50	140	120	40	------
W	40	20	------	100	50	40	150	125	100	------
Z	100	70	30	400	200	100	450	350	225	------
A-1	75	25	------	120	110	80	325	200	120	------
Average	71	38	18	231	100	133	1,302	1,203	1,285	------
Average omitting T	52	39	19	211	142	93	324	217	142	------

*The active agents were: for 1, A and D, para-diisobutylphenoxyethoxyethyldimethylbenzyl ammonium chloride; for 2, diisobutylcresoxyethoxyethyldimethylbenzyl ammonium chloride; for 5, P, S, T, U, and W, alkyldimethylbenzyl ammonium chloride; for L, N (acylcolamineformylmethyl) pyridinium chloride; and for M, para-tertiaryoctylphenoxyethoxyethyldimethylbenzyl ammonium chloride. The active agents for I, Z, and A-1 were not definitely determined.

table to illustrate the effect which was encountered consistently with detergent-sanitizer combinations. Two sets of averages were prepared for the results in this table. One excluded the results obtained with T, as they were so abnormal that the averages which included them were not representative.

The marked effect of the diluting water on the bactericidal efficiency was observed with every compound. In general, the pattern of the interference was the same in all cases regardless of whether the comparisons were made for 1-, 2-, or 5-minute intervals of exposure. For practical application, the 1-minute exposure results are of greatest significance. The average parts per million of active agent of these 14 compounds required to produce a 100 percent kill of *E. coli* in 1 minute in synthetic, Cincinnati and Norwood tap waters, respectively, were 52, 211, and 324, approximately a ratio of 1:4:6. A review of the data in the table shows that these ratios for the individual compounds are not too divergent, varying from a minimum of approximately 1:2:4 with A-1 to a maximum of 1:10:14 with U. In all cases the influence of the water on the bactericidal effectiveness of the compounds was quite marked.

In the case of product T referred to above, which was a combination of a sanitizer and a detergent, the ppm required for a 1-minute kill in the three waters were 30, 500, and more than 15,000, respectively; a ratio of approximately 1:17:500. It should be noted here that the active agent in T (with detergent added) was the same as the active agent in U (without detergent). It is evident from the data that the detergent interfered markedly with the bactericidal efficiency of the active agent, and that this interference was not the same for different waters. That is, the average ratio of ppm of active agent required for Cincinnati tap to the ppm for Norwood tap is less than 1:2 for all products other than T, while for T this ratio was 1:30 or more (500:more than 15,000).

In the last column of table 2 there is recorded the ppm of active agent recommended for use by the producers of some of the products tested. It will be observed from the data in the table that in no instance was this recommended dosage sufficient to produce a 100 percent kill of the bacteria under test in Norwood tap water in 1 minute; also that in only 4 out 7 cases was the recommended dosage sufficient to produce this effect in Cincinnati tap water. This failure to recommend the use of an adequate amount of their products, however, should not be construed as an indication of unreliability or of a lack of integrity on the part of the producers of these products, for as has been indicated, these producers in making, or having made, tests on the bactericidal efficiency of their products, undoubtedly relied on the results of tests which were made either in distilled or in buffered distilled waters (phenol coefficient tests).

The bactericidal efficiency obtained in using buffered distilled water yielded results as observed in table 2, which made the producers' recommendations provide safety factors of from twofold to eightfold. For this reason it is believed that it was undoubtedly the intent of the producers to recommend for their respective products dosages which would provide for a 100-percent kill of vegetative bacteria in 1 minute with a liberal factor of safety. The interference produced by natural waters in which the products were used was responsible for the failure in the effectiveness of the dosages recommended.

Rapidity of Interference Reaction

Observations were made to determine whether the reduction in bactericidal efficiency produced by the diluting water was an instantaneous or a progressive reaction. To do this, master portions of diluted Q.A.C. were prepared. An initial test of the bactericidal properties was made as quickly as possible after the dilution was completed (usually within 1 to 2 minutes); a second portion was tested after the stock dilution had stood at room temperature for 4 hours, and a third portion after 24 hours. All tests were made by the standard procedure. Three representative Q.A.C. were used in these tests with both Cincinnati and Norwood tap waters. All tests were repeated at least once; a total of 66 observations were made in this series. In no test was there any result indicating that a significant reduction in bactericidal efficiency had occurred after the initial examination; slight variations in the ppm required were observed, but these were all well within the limits established in table 1. This leads to the conclusion that in general the compounds are stable in these waters after the initial reaction reducing the bactericidal efficiency has taken place, and that this initial reaction occurs instantaneously or at least during the first minute of contact. These observations are supported by the fact that, among large numbers of bottles of commercial products (usually 10 percent concentrations of Q.A.C.) standing on laboratory shelves for a year or longer, in only one instance was deterioration of the product determined. In this one case active bacterial growth occurred in a stock commercial bottle.

Effect of Temperature

In investigating the influence of temperature on the bactericidal properties of the Q.A.C. a temperature range of from 12° to 46° C. was used. This range was selected as representing the extremes (based on sensory reactions) which probably would be encountered in hand-dishwashing procedures. For purposes of illustration the results obtained have been grouped in ranges of 12° to 17° C., 18° to 26° C., 33° to 39° C., and 40° to 46° C. These results are presented in table 3.

Table 3. *Effect of temperature variations on bactericidal properties*

Q.A.C. compound	Ppm of Q.A.C. which will produce a 100 percent kill in 1, 2, and 5 minutes in Cincinnati tap water in temperature ranges of:											
	12°-17° C.			18°-26° C.			33°-39° C.			40°-46° C.		
	1	2	5	1	2	5	1	2	5	1	2	5
A	-----	-----	-----	175	-----	160	100	80	60	60	-----	40
D	225	200	150	200	200	100	100	-----	75	-----	-----	-----
I	-----	-----	-----	100	-----	50	80	-----	20	30	-----	-----
M	-----	-----	-----	200	150	-----	150	-----	100	-----	-----	-----
P	200	150	100	125	100	100	70	40	30	30	20	-----
S	200	150	100	90	80	40	60	-----	40	30	20	-----
U	100	80	40	100	75	50	-----	-----	-----	-----	-----	-----
Average	181	145	98	141	121	83	93	-----	54	38	-----	-----

Q.A.C. compound	Ppm of Q.A.C. which will produce a 100 percent kill in 1, 2, and 5 minutes in Norwood tap water in temperature ranges of:											
	12°-17° C.			18°-26° C.			33°-39° C.			40°-46° C.		
	1	2	5	1	2	5	1	2	5	1	2	5
A	-----	-----	-----	300	200	150	200	150	-----	160	120	80
D	500	500	350	300	160	120	250	250	150	-----	-----	-----
I	-----	-----	-----	250	175	125	100	50	50	50	-----	25
M	-----	-----	-----	300	225	150	250	200	150	-----	-----	-----
P	500	400	200	220	120	80	125	100	100	60	40	20
S	400	300	200	500	200	-----	75	50	25	55	-----	-----
U	600	500	200	140	120	40	-----	-----	-----	-----	-----	-----
Average	500	425	238	287	171	111	167	133	95	81	-----	42

In this section of the study, no effort was made to examine statistically the temperature coefficient relations as the other variables and uncontrolled interfering factors did not justify such critical study. However, the recorded results show the marked influence of temperature on the bactericidal efficiency of these compounds. In general the concentration required to obtain a 100 percent kill in 1 minute at the temperature ranges of 12°–17° C., 18°–26° C., and 33°–39° C. were respectively five, three and two times that required in the range of 40°–46° C. This temperature effect was consistent in all tests, and for all periods of exposure although, as would be anticipated, the differential tended to decrease as the period of exposure was increased.

Influence of Hydrogen-ion Concentration

In exploring the effect of hydrogen-ion concentration on the bactericidal activity of these compounds, more than 130 tests were made using 33 different products, in pH ranges of 6.5 to 9.5. These limiting ranges were used as it was not likely that waters of a pH value below 6.5 would be encountered and at pH ranges of 9.5 and above the hydrogen-ion concentration of the water would be a factor in the bactericidal process. In all tests, the results showed that the bactericidal efficiency was affected by changes in the hydrogen-ion concentration. However, with approximately 50 percent of the products examined, their bactericidal activity was enhanced by increases in pH, and with the other half a lowering of the pH increased the bactericidal action, apparently to about the same degree. Consequently, no general statement can be made regarding the influence of pH on the bactericidal action of the Q.A.C. except that they are all affected by the hydrogen-ion concentration of the suspending menstrum. The direction and extent of the effect must be determined for the particular product in use.

Substances Inhibiting Bactericidal Efficiency

Extensive exploratory tests were made to determine the agents which were responsible for the lowering of the bactericidal efficiency of these compounds. Tests were made with inorganic and organic compounds, and various detergents; and detailed studies, with solutions of Castile soap. With some of the Q.A.C., the presence of small amounts of phosphate completely inhibited their bactericidal action. Calcium and magnesium salts markedly restricted the activity of all of the compounds tested. At one time during the course of the study, it was believed that the degree of interference of a water could be correlated with the concentration of the salts present which are normally responsible for the hardness of waters. However, as the study progressed, it was observed that *"hardness" compounds were* *only one of the many factors which impaired efficiency.* The removal of dissolved gases by aeration reduced the interference of some waters. Boiling or sterilizing by autoclaving two of the natural tap waters under test markedly reduced their interfering action although no visible precipitation or clouding occurred which would indicate the removal of some substances from solution. It is believed that the efficiency of the Q.A.C. as bactericidal agents is reduced by a variety of substances and compounds, many of which have not been determined or the extent of their interference measured.

In the tests with Castile soap seven of the more generally used Q.A.C. were studied. The amount of soap required to destroy the effective action of the concentration of Q.A.C. recommended for use by the producer varied from 1 to 60 ppm; one required only 1 ppm, and two each of the other six required 10, 20, and 60 ppm, respectively, to produce the same effect. This indicates the necessity of adequately rinsing a utensil before it is exposed in the Q.A.C. sanitizer bath. In this connection, the possibility of the production of interfering soaps at the site through the interaction of the alkaline Q.A.C. concerned and fat or oil films left on the surface of utensils should not be overlooked.

The magnitude of the effect of interfering substances on the bactericidal action of the Q.A.C. varies under the conditions of use and especially with the nature of the water in which they are used. This is of the greatest importance when detergent-sanitizer combined preparations are considered. Even though it involves repetition this point is emphasized by referring again to the average results obtained with preparations U and T as recorded in table 2. Preparation T differed from U only in that a good detergent had been incorporated in T. Basing the comparison on the 1-minute kill, the results obtained in pure water (which would be used ordinarily by a producer in testing his product) show that the addition of the detergent reduced the bactericidal effectiveness of the sanitizer threefold. However, the results also show that in two tap waters the addition of the detergent reduced the bactericidal activity fivefold and more than a hundredfold, respectively.

Tests for Residuals

The Public Health Service Ordinance and Code (*1*) provides for the use of chemical bactericidal agents subject to certain conditions. One of these conditions is that the residual concentration of the active bactericidal agent must be measurable by a simple and accurate field test. The primary importance of this requirement is illustrated excellently in the development of the practice of chlorination as a bactericidal process in the water purification field. With the introduction of the use of chlorine as a bactericidal agent in water purification and the ensuing spectacular results, it was believed generally that the addition of a certain fixed amount of chlorine (a recommended dosage) would provide for adequate disinfection of all waters. Several years were spent in practical search for this ideal chlorine dosage. It was found that it was not the initial amount of chlorine added which determined the effectiveness of the disinfection process, but more probably the amount of chlorine remaining in the water (the residual) after a certain period of contact. Tests were devised for the determination of residual chlorine and various periods of exposure were investigated. Still success was not attained, for it was found that residuals effective for one water supply were ineffective for others. There was no consistency in the results obtained. Then it was learned that when chlorine was added to water, addition products were formed which varied with the chemical composition of the water to which the chlorine was added. It was also learned that (1) these addition products were not as effective bactericidal agents as chlorine, in some instances relatively ineffective, and (2) these addition products were measured as chlorine by the current tests for residuals. New residual tests were developed which would differentitate between uncombined chlorine and its addition products—tests which measured residual chlorine in terms of its bactericidal efficiency. At last success was attained in the control of the disinfection of water with chlorine. The experience with disinfection by chlorine should serve as a guide for the control of the use of other chemical bactericidal agents.

In the present study tests for residual bactericide were made on nine representative Q.A.C. with 11 commercial test kits which were available for use. Test kits which failed to measure with a fair degree of accuracy the residuals of the product for which they were designed when the Q.A.C. was dissolved in buffer distilled water were judged to be useless. Five of the kits used fell within this category. The results obtained with the remaining six are presented in table 4.

Table 4. *Relation of bactericidal activity to residual Q.A.C. as determined by field test kits*

Q.A.C. compound	Ppm of Q.A.C. required for a 100 percent kill in 1 minute		Ppm of residual Q.A.C. determined by test kit		Test kit used	Ratio ppm required for 1 minute kills—Cincinnati tap: pure water
	Pure water	Cincinnati tap water	Pure water	Cincinnati tap water		
L	75	600	100−	600	a	8 : 1
P	20	200	20±	200−	b	10 : 1
S	30	200	30±	200	c	7 : 1
U	0.5	100	Too low to test	100	b	200 : 1
T	5	3,000	Too low to test	3,000±	b	600 : 1
D	<50	225	50	200+	d	5 : 1
C	60	220	50+	200+	e	4 : 1
M	30	200	30±	200	d	7 : 1
O-I	50	6,400	50	6,400±	f	128 : 1

It may be noted that in all instances, in both buffered distilled water (pure water) and in Cincinnati tap, all six test kits measured with a high degree of accuracy residuals in terms of the amount of Q.A.C. added initially. However, in natural waters these readings did not bear any relation to the amount of active bactericidal residual present, indicating residuals which were in error by from fourfold to six hundred fold. For instance, in line one of table 4 test kit "a" indicated the presence of 600 ppm of residual Q.A.C. (the amount which had been added at the start), whereas the bacteriological evidence, repeatedly confirmed, indicated that only 75 ppm of active bactericidal agent were present. The remaining 525 ppm of residual Q.A.C. measured by this test kit represented an altered compound which was no longer actively bactericidal. As shown in the table, the magnitude of these errors is so great that the results obtained with these kits with natural waters would be valueless and very misleading. Studies looking toward the development of such residual tests are being made by Weber (*11*).

Tests which measure residuals in terms of their active bactericidal content are a primary essential for the economic and safe use of any chemical method of disinfection. In using disinfecting procedures in the absence of satisfactory residual tests, the only safe alternative is to make bacteriological examinations with the product under consideration in the water to be used and under the conditions in which it will be used.

Summary

The general characteristics of the Quaternary Ammonium Compounds and various test methods described in the literature for the determination of their bactericidal efficiency are reviewed. A detailed procedure is described for the determination of the bactericidal efficiency, under operating conditions, of Q.A.C and other chemical agents proposed for use as bactericides. Using this procedure with *Escherichia coli* as the test organism, the bactericidal efficiency of 11 quaternary ammonium compounds which are used as the active agents in 40 commercial sanitziers has been determined. Tests for residual active agents were also made.

The results obtained show that:

1. The bactericidal efficiency is affected markedly by the nature of the water in which the compound is used. The concentration of active agent required to produce a 100-percent kill in 1 minute varies from 15 to 500 ppm.

2. The interference with bactericidal efficiency induced by different waters occurs almost instantaneously and does not increase with time of exposure.

3. Within the range, 12° to 46° C., which might be used, temperature has a marked influence on the bactericidal efficiency of these compounds, the higher the temperature the more effective the toxic action.

4. The toxic action is affected by changes in the hydrogen-ion concentration of the solutions, but the direction of change varies with the compound—the decreases enhance the potency of some compounds and reduce that of others.

5. The bactericidal efficiency is reduced by various substances and compounds in addition to the "hardness" salts. Small amounts of soap or other detergent almost invariably reduces the action markedly. With some waters the removal of dissolved gases by aeration or boiling reduces the interference with the bactericidal activity.

6. Test procedures available for the determination of residual compounds in terms of active bactericidal agent yield very unreliable results in natural waters.

7. In the absence of any satisfactory residual test for determining the amount of effective bactericidal agent present, it is essential to control the action by bacteriological examinations with the product under the conditions in which it is used.

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Haplomycosis in Montana Rabbits, Rodents, and Carnivores

By William L. Jellison*

Haplomycosis is the name proposed by Emmons (*1*) for a disease of animals characterized by the presence in the lungs of the fungus *Haplosporangium parvum*. This fungus was first cultured during a survey of mycotic infections of rodents in southern Arizona by Emmons and Ashburn (*2*). Of the 303 rodents examined and cultured in their survey, 25 were found infected with *Coccidioides immitis* and 101 with *H. parvum*. Nine rodents were infected with both fungi.

A wide range of rodent hosts in nature is indicated by the variety of animals found infected in Arizona which included 23 of 124 *Perognathus*, 3 of 29 *Dipodomys*, 5 of 10 *Citellus*, 1 of 27 *Onychomys*, and 2 of 113 *Peromyscus*.[1]

The presence of *Haplosporangium parvum* in native rodents in Alberta, Canada, was noted by Dowding (*3*, *4*) soon after the Emmons and Ashburn survey. Dowding found large fungus cells in the lungs of 14 animals and established the fungus in culture from 8 of these. Infected animals included 13 white-footed deer mice, *Peromyscus maniculatus borealis*, and one red squirrel, *Tamiasciurus hudsonicus baileyi*. In a later publication, Dowding (*5*) reported that the infection had probably been found in muskrats in British Columbia by Ian McTaggert Cowan of the University of British Columbia, but she did not state on what evidence the diagnosis had been based. Numerous infected muskrats have been found in western Montana as reported later in this paper.

What appears to be the first observation on haplomycosis, although not identified at the time, was made by Dr. Arnold B. Erickson of the University of Minnesota and reported in 1949 (*6*). The lungs of a beaver collected in Aitkin County, Minnesota, March 31, 1941, were observed to contain an abundance of small discrete white nodules. The writer has examined sections of this material and agrees that the organism is *Haplosporangium* sp., although presence of infection in rodents in that area has not been confirmed by culture.

In 1944 the writer found and later recorded (*7*) the presence of some unidentified bodies, presumably parasites, in the lungs of a rock rabbit, *Ochotona princeps*, in Ravalli County, Montana. The fungoid nature of these bodies was suspected but culture was not attempted. A similarly infected rock rabbit was collected nearby in Granite County, Montana, August 19, 1947, by Major Robert Traub, parasitologist of the Army Medical School, and the writer. Culture was attempted from this animal but was not successful.

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[1] The species studied in this survey by Emmons were *Peromyscus eremicus*, *Perognathus baileyi*, *P. penicillatus*, *P. intermedius*, *Dipodomys merriami*, and *Citellus harrisi*. One or more animals of each species was found infected according to Emmons (personal communication, Feb 8, 1950).

The fungoid nature of these bodies remained unconfirmed until July 1949, when a cottontail rabbit, *Sylvilagus nuttallii*, shot in Ravalli County, Montana, was found on examination to have small scattered white nodules in the lung tissue similar to those found in the rock rabbits examined previously. Individual cysts were teased out, washed repeatedly in sterile saline, and planted on tubes of Littman's medium (*8*). Mycelial growth developed in about one week. Transfers have been identified as *Haplosporangium* sp. and the identification confirmed by Dr. Emmons. Typical infections in experimental animals have been produced by this culture.

Although not specifically recognized at the time, the first infected animal found in western Montana was a large female skunk, *Mephitis hudsonica*, trapped March 9, 1944, at Post Creek, Lake County, Montana, by Delbert Palmer of Charlo, and autopsied by the writer. Blood samples were being collected from skunks for serological studies. The lungs of this animal showed numerous discrete white spots and so were preserved in formalin for histological study. When sections were made and examined in 1949 by Dr. J. K. Frenkel, pathologist at the Rocky Mountain Laboratory, the white spots were identified as nodules containing fungus cells of *Haplosporangium* sp. This diagnosis has been further confirmed by establishing cultures from several other skunks in Lake County during November 1949

Lung sections from a wood rat, *Neotoma fuscipes*, collected near Hastings Natural History Reservation, California, were sent to the writer by Dr. Jean M. Linsdale. These sections contained numerous bodies typical of the cells of *Haplosporangium* sp. The presence of this fungus in *Neotoma* and other small mammals on the Hastings Reservation has since been confirmed by culture (Emmons, unpublished data).

There remains some question as to the specific identity of the fungus found in Canadian and Montana mammals. The species found in Arizona was named *H. parvum* by Emmons and Ashburn (*2*) and was in part characterized by the spherical fungus cells of about 14μ in diameter found in the lung tissue. In experimentally infected animals the fungus cells reached a diameter of 40μ. On the basis of mycelial growth and conidiospore formation, Dowding (*3*) identified cultures from rodents in Alberta as *H. parvum*. However, she observed that the fungus cells in lung tissue reached a size of 270μ. Measurements of similar cells from *Ochotona* in Ravalli County were 360μ to 390μ. More detailed studies on the cultural characters of numerous strains of this fungus and of their infectivity for experimental animals are being made by Dr. Emmons and by the writer.

Since the culture and identification of *Haplosporangium* sp. from the cottontail collected July 22, 1949, a rather extensive survey has been made of the native animals in western Montana and northern Idaho by autopsy, direct examination, and culture for the presence of this fungus. Numerous species of both rodents and carnivores have been found infected.

Survey Studies

In September 1949 Dr. C. W. Emmons, mycologist from the National Institutes of Health, visited the Rocky Mountain Laboratory to confer with the writer on this problem and to examine native animals in the laboratory and in the field. One trip was made by Dr. Emmons, William Fullerton, and the writer to Blue Nose Peak, elevation 8,887 ft., on the Montana-Idaho Divide, 60 miles south of Hamilton, Mont., where rock rabbits, *Ochotona princeps*, were known to be quite abundant. Autopsies and cultures were made in the field on rock rabbits and other freshly shot or trapped animals. A few of the mice trapped were held in below-freezing temperature for later examination. Other captured animals were examined at the laboratory.

This work resulted in establishment of cultures of *Haplosporangium* sp. from the following hosts: one female wood rat, *Neotoma cinerea*, from near Boulder Creek, West Fork of the Bitter Root River, Ravalli County, trapped by Harley Sargent, laboratory aide; one rock rabbit, *Ochotona princeps*, shot on Blue Nose Peak, Montana-Idaho Divide; one white-footed deer mouse, *Peromyscus maniculatus*, trapped near Horse Creek Pass, Lemhi County, Idaho.

In July 1949, a trip was made to Lake County, Mont., with Harley Sargent, to collect and examine additional skunks for infection with *Haplosporangium* sp. Through the cooperation of Delbert and Louis Palmer, of Charlo, eight skunks were trapped or shot, including seven young of the year and one adult animal. Typical fungus cells were found in the lungs of the adult animal. Cultures were made on all eight skunks; no isolations were obtained.

A third trip was made to Lake County in November 1949 to work with Delbert and Louis Palmer who were trapping in the vicinity of Charlo. At this time 23 skunks were examined and cultured. Cultures typical of *Haplosporangium* sp. were established from three skunks, *Mephitis hudsonica*. Very heavy concentrations of fungi were

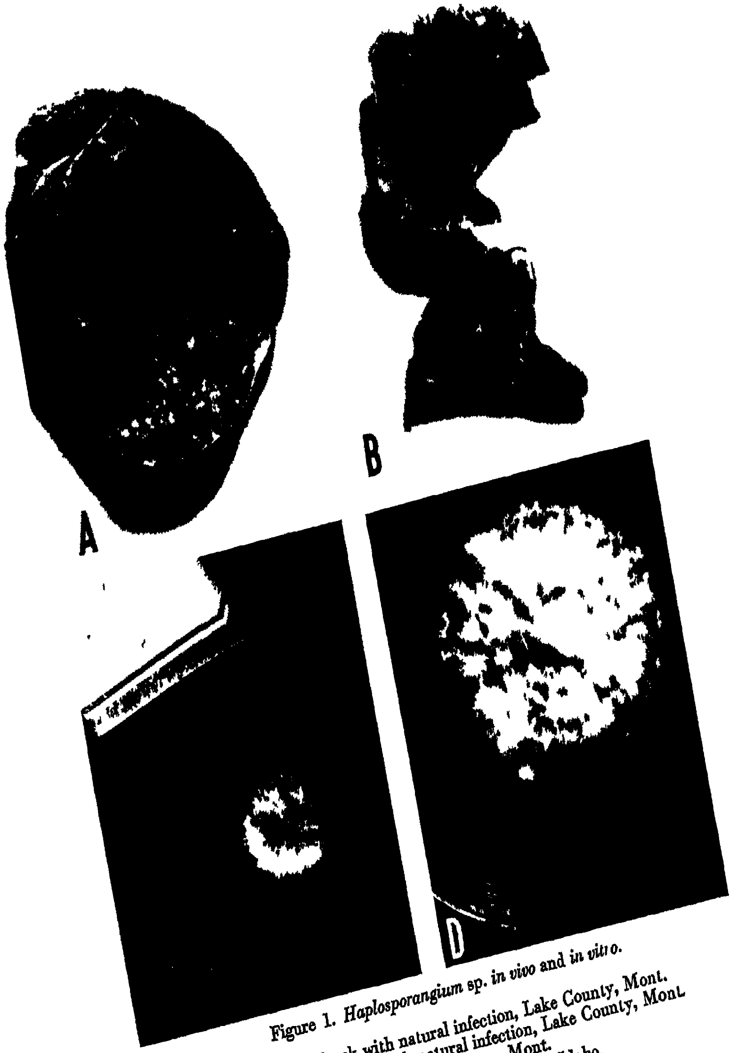

Figure 1. *Haplosporangium* sp. *in vivo* and *in vitro*.

A. Portion of lung of skunk with natural infection, Lake County, Mont.
B. Portion of lung of muskrat with natural infection, Lake County, Mont.
C. Test tube culture from skunk, Lake County, Mont.
D. Petri dish culture from deer mouse, Lemhi County, Idaho.

found in the lungs of several animals. Two of these infected skunks came from a den of seven found under a chicken house at the Roberts farm south of Charlo.

The Palmer brothers were also trapping weasels and mink and, though muskrat season was not open, a few of these animals taken inadvertently in mink sets were brought in for examination. No cultures were established and no fungi were found in any of the mink examined from Lake County. Cultures typical of *Haplosporangium* sp. were established from three of the weasels, two *Mustela frenata* and one *M. erminea,* collected in Lake County.

Muskrats, *Ondatra zibethica,* trapped on the Wall farm, 1½ miles north of Charlo, showed such extremely heavy infestations that considerable areas of the lungs appeared consolidated. Cultures of *Haplosporangium* sp. were established from three of four muskrats from this farm and from one muskrat on the Morris farm near Charlo. This would tend to confirm the suspected findings of *Haplosporangium* sp. in muskrats in British Columbia as reported by Dowding (*5*).

Arrangements were made with the Palmer family to save in cold storage the lungs of a series of muskrats to be trapped when the regular season opened. On December 6, frozen lungs were obtained from 126 muskrats which were trapped in the general vicinity of Charlo. No attempt was made to culture these lungs, but they were examined microscopically before and after partial digestion in 2 percent NaOH solution. Typical fungus cells were found in 23 sets of lungs, or 18 percent of the animals. Infestations varied from single cells to almost complete consolidation of the lungs by masses of fungi and their surrounding tissue nodules.

In the course of other survey studies, cells typical of *Haplosporangium* have been found in the following hosts: an adult female, *Peromyscus maniculatus,* Ravalli County, October 26, 1949, trapped by Lawrence Humble (a culture was established from a single cell found in this animal); a weasel, *Mustela frenata,* Ravalli County, November 3, 1949, shot by Martin Shoffner (a single cell found); a weasel, *M. frenata,* Ravalli County, July 22, 1949, shot by the writer (this animal had an extremely heavy infection); a pine squirrel, *Tamiasciurus hudsonicus,* shot in Skalkaho Canyon, Ravalli County, November 17, 1949, by Dr. Robert Philip and William Fullerton; a pine marten, *Martes americana,* trapped near Holland Lake, Missoula County, Mont., December 1949 by Dr. Philip Wright, Professor of Zoology, University of Montana (single cell found in lungs); three of four beavers, *Castor canadensis,* trapped in Ravalli County, December 1949, by M. J. Watt, Deputy Game Warden; a mink, *Mustela vison,* trapped in Ravalli County, March 8, 1950. These and other collections are shown in the table.

Summary

Haplomycosis is a pulmonary disease of mammals caused by infection with one or more species of the fungus *Haplosporangium.* It was first found in ground squirrels, mice, and kangaroo rats in a semidesert area in Arizona. Mice and a tree squirrel in Alberta, Canada,

Rodents, rabbits, and carnivores found infected with Haplosporangium *sp.*

Animal No.	Host	Location	Date	Fungus cells in lungs	Cultures established
20777	Skunk	Lake Co., Mont	Mar. 9, 1944	+	
21285	Rock rabbit	Ravalli Co., Mont	July 24, 1944	+	
21840	do	Granite Co., Mont	Aug. 19, 1947	+	
26528	Skunk	Lake Co., Mont	July 14, 1949	+	
26756	Wood rat	Ravalli Co., Mont	Sept. 1, 1949		+
26761	Rock rabbit	do	Sept. 9, 1949		+
26850	Weasel	do	July 22, 1949	+	+
26852	Cottontail	do	do	+	+
27097	White-footed mouse	Lemhi Co., Idaho	Sept. 3, 1949	+	+
27110	do	Ravalli Co., Mont	Oct. 26, 1949	+	+
27113	Weasel	do	Nov. 3, 1949	+	
27123	Skunk	Lake Co., Mont	Nov. 16, 1949	+	+
27124	do	do	do	+	+
27128	do	do	do	+	+
27130	Muskrat	do	Nov. 15, 1949	+	+
27135	Pine squirrel	Ravalli Co., Mont	Nov. 17, 1949	+	
27188	Weasel	Lake Co., Mont	Nov. 1949	+	+
27189	do	do	Nov. 1949	+	+
27190	Muskrat (23 of 126 positive)	do	Dec. 1949	+	
27199	Beaver	Ravalli Co., Mont	Dec. 1949	+	
27210	Pine marten	Missoula Co., Mont	Dec. 1949	+	
27242	Muskrat	Lake Co., Mont	Nov. 18, 1949	+	+
27255	do	do	Nov. 20, 1949	+	+
27258	Weasel	do	Nov. 1949		+
27261	Muskrat	do	Nov. 21, 1949	+	+
27274	Weasel	Ravalli Co., Mont	Jan. 23, 1950		+
27308	Cottontail	do	do	+	
27320	Beaver	do	Feb. 1950	+	
27321	do	do	Feb. 1950	+	
27330	Muskrat	Lake Co., Mont	Feb. 12, 1949	+	
27342	Weasel	Ravalli Co., Mont	Feb. 14, 1950	+	
27347	White-footed mouse	do	Feb. 13, 1950	+	
27357	Muskrat	do	Mar. 2, 1950	+	
27358	Muskrat (2 of 6 positive)	do	do	+	
27382	Muskrat (2 of 4 positive)	do	Mar. 4, 1950	+	+
27387	Mink	do	Mar. 8, 1950	+	
27440	Muskrat	Powell Co., Mont	Mar. 20, 1950	+	+

and a beaver in Minnesota have been reported infected. This fungus is recorded here for the following hosts from western Montana: beaver, muskrat, pine squirrel, and white-footed mouse of the order Rodentia; rock rabbits and cottontails of the order Lagomorpha; mink, pine marten, skunk, and weasel of the order Carnivora. The known mammalian hosts of *Haplosporangium* spp. have a wide geographical, ecological, and zoological distribution.

ACKNOWLEDGMENT

This study was carried out as a cooperative project with Dr. C. W. Emmons, Principal Mycologist, Laboratory of Infectious Diseases, National Institutes of Health, Bethesda, Md. Besides the accessions noted, Biological Aides Lawrence M. Humble and William T. Smith collected many of the animals examined. Most of the laboratory examinations were made by Miss Roma Fullberg, Biological Aide. Special thanks are due the E. M. Palmer family at Charlo, Montana, who secured animals for study in Lake County and provided field laboratory facilities at their home on several occasions. The weasels were determined by Dr. Philip Wright, Professor of Zoology, University of Montana.

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Communities Awarded Milk Sanitation Ratings of 90 Percent or More, July 1948–June 1950[1]

This is the semiannual revision of the list of Public Health Service milk ordinance communities which were reported by State milk-sanitation authorities during the 2-year period July 1, 1948, to June 30, 1950, as having a market milk rating of at least 90 percent. The inclusion of a community in this list means that, if pasteurized milk is sold in the community, it is of such a degree of excellence that the weighted average of the percentages of compliance with the various items of sanitation required by the Public Health Service Milk Ordinance for grade A pasteurized milk is 90 percent or more, and that, similarly, if raw milk is sold in the community, it so nearly meets the standards that the weighted average of the percentages of compliance with the various items of sanitation required for grade A raw milk is 90 percent or more.

These ratings are not a complete measure of safety, but represent the degree of compliance with the grade A standards. High-grade pasteurized milk is safer than high-grade raw milk because of the added protection of pasteurization. Safety estimates should take into account the percentage of milk pasteurized, which is given in the table. To obtain this added protection, those who are dependent on raw milk can pasteurize the milk at home by the use of an approved home pasteurizer or by either of the following methods: (1) after the water in the bottom of a double boiler has been brought to a vigorous boil, place the inner container with milk in the outer container, cover it, and continue to apply the same heat for 10 minutes; or (2) heat the milk in an open saucepan over a hot flame to 165° F., stirring constantly, then immediately place the vessel in cold water and continue stirring until cool, changing the water when it warms up; however, if a dependable thermometer is not available, bring the milk to a boil instead. Method 1 produces a cooked flavor, while method 2 is not quite as safe as method 1.

The milk ordinance recommended by the Public Health Service is now in effect State-wide in 13 States, as well as in 360 counties and 1,464 municipalities located in 39 States. It has been adopted as a regulation by 34 States and Territories.

The primary reason for publishing the rating lists is to encourage these communities to attain and maintain a high level of excellence in the enforcement of the ordinance. No comparison with communities operating under other milk ordinances is intended or implied. Some communities which have high-grade milk supplies are not included because arrangements have not been made for the determination of their ratings by the State milk sanitation authority. In other cases the ratings which have been submitted are now more than 2 years old and have therefore lapsed. In still other communities with high-grade milk supplies there seems, in the opinion of the community, to be no local necessity nor desire for rating or inclusion in the list.

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[1] From Division of Sanitation, Milk and Food Branch.

The rules under which a community is included in this list are as follows:

1. All ratings must be determined by the State milk-sanitation authority in accordance with the Public Health Service rating method.[2] based upon the grade A pasteurized milk and the grade A raw milk requirements of the Public Health Service Milk Ordinance and Code. A recent departure from the method described consists of computing the pasteurized milk rating by weighting the plant rating twice as much as the rating of the raw milk for pasteurization.

2. No community will be included in the list unless both its pasteurized milk and its raw milk ratings are 90 percent or more. Communities in which only raw milk is sold will be included if the raw milk rating is 90 percent or more.

3. The rating used will be the latest rating submitted to the Public Health Service, but no rating will be used which is more than 2 years old. In order to promote continuous rigid enforcement rather than occasional "clean-up campaigns" it is suggested that when the rating of a community on the list falls below 90 percent no resurvey be made for at least 6 months, which will result in removal from the next semiannual list.

4. The Public Health Service will make occasional check surveys of cities for which ratings of 90 percent or more have been reported by the State. If such check rating is less than 90 percent but not less than 85, the city will be removed from the 90-percent list after 6 months unless a resurvey submitted by the State during this probationary interim shows a rating of 90 percent or more. If, however, such check rating is less than 85 percent, the city will be removed from the list immediately. If the check rating is 90 percent or more, the city will be retained on the list for a period of 2 years from the date of the check survey unless a subsequent rating submitted during this period warrants its removal.

Communities which are now on the list should not permit their ratings to lapse since ratings more than 2 years old cannot be used.

State milk-sanitation authorities who are not now equipped to determine municipal ratings are urged, in fairness to their communities, to equip themselves as soon as possible. The personnel required is small; in most States one milk specialist is sufficient for this work.

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[2] Pub. Health Report 53:1386 (1938). Reprint No. 1970.

Communities Awarded Milk Sanitation Ratings of 90 Percent or More, July 1948–June 1950

Community	Percent of milk pasteurized	Date of rating
ALL MARKET MILK PASTEURIZED		
ALABAMA		
Auburn	100	Sept. 29, 1949
Birmingham and Jefferson County	100	Nov. 17, 1949
Montgomery	100	May. 11, 1950
COLORADO		
Colorado Springs	100	Nov. 1949
Grand Junction	100	Mar. 29, 1950
FLORIDA		
Panama City	100	Sept. 18, 1948
GEORGIA		
Columbus	100	Oct. 27, 1949
Cordele	100	Sept. 8, 1949
Quitman	100	Aug. 25, 1949
West Point	100	Mar. 29, 1949
IDAHO		
Bonners Ferry	100	Mar. 14, 1949
Caldwell	100	Apr. 14, 1949
Idaho Falls	100	Aug. 24, 1949
Preston	100	Nov. 16, 1948
Sandpoint	100	May 14, 1949
ILLINOIS		
Champaign-Urbana	100	Aug. 18, 1948
Chicago	100	Oct. 28, 1949
Decatur	100	Apr. 27, 1950
East Moline	100	May 18, 1950
Elgin	100	Dec. 8, 1949
Glencoe	100	Nov. 7, 1949
Highland Park	100	Nov. 7, 1949
Kenilworth	100	Nov. 7, 1949
Lake Bluff	100	Nov. 7, 1949
Lake Forest	100	Nov. 7, 1949
Moline	100	May 18, 1950
Northfield	100	Nov. 7, 1949
Oak Park	100	Sept. 1949
Peoria	100	Apr. 15, 1950
Rock Island	100	May 10, 1950
Silvis	100	May 18, 1950
Skokie	100	Nov. 7, 1949
Waukegan	100	Nov. 2, 1949
Winnetka	100	Nov. 7, 1949
INDIANA		
Anderson	100	Dec. 19, 1949
Hope	100	1950
Indianapolis	100	July 1948
South Bend	100	Nov. 1948
KANSAS		
Dodge City	100	May 24, 1950
KENTUCKY		
Hopkinsville	100	Mar. 1950
Owensboro	100	Apr. 8, 1949
Paducah	100	May 5, 1950
MISSOURI		
Columbia	100	Dec. 1949
NORTH CAROLINA		
Charlotte	100	Feb. 23, 1950
Cumberland County	100	Feb. 10, 1950
Mars Hill	100	Dec. 7, 1949
Transylvania County	100	Jan. 16, 1949
OKLAHOMA		
Cushing	100	Feb. 10, 1950
TENNESSEE		
Athens	100	June 14, 1950
Bristol	100	Nov. 4, 1949
Chattanooga	100	Oct. 26, 1949
Columbia	100	Apr. 20, 1950
Erwin	100	Feb. 17, 1949
Fayetteville	100	May 10, 1949
Franklin	100	May 5, 1950
Greenville	100	Oct. 7, 1949
Kingsport	100	Sept. 23, 1949
Knoxville	100	Sept. 23, 1949
Lewisburg	100	Apr. 17, 1950
Maryville-Alcoa	100	Aug. 31, 1948
Morristown	100	Oct. 13, 1949
Shelbyville	100	June 13, 1949
TEXAS		
Galveston	100	Apr. 18, 1949
Gladewater	100	July 25, 1949
Harlingen	100	Mar. 20, 1950
Houston	100	Dec. 3, 1948
Kilgore	100	July 25, 1949
Lufkin	100	Apr. 12, 1949
San Antonio	100	Mar. 11, 1950
Texarkana	100	Mar. 30, 1949
Texas City	100	Apr. 25, 1949
Tyler	100	Mar. 2, 1950
Weslaco	100	Apr. 5, 1950
UTAH		
Ogden	100	June 1, 1949
Provo	100	Apr. 29, 1949
Salt Lake City	100	May 27, 1949
VIRGINIA		
Boydton	100	Apr. 4, 1950
Bristol	100	Nov. 4, 1949
Lawrenceville	100	Apr. 6, 1950
Pulaski	100	June 1950
Radford	100	June 1950
Richmond	100	May 1950
Suffolk	100	May 24, 1950
Waynesboro	100	May 19, 1949

Communities Awarded Milk Sanitation Ratings of 90 Percent or More, July 1948–June 1950—Continued

Community	Percent of milk pasteurized	Date of rating
BOTH RAW AND PASTEURIZED MARKET MILK		
GEORGIA		
La Grange	76.2	Mar. 29, 1949
Macon	97.1	Sept. 13, 1949
Thomaston	79.7	May 24, 1950
Thomasville	81.5	July 28, 1948
IDAHO		
Boise	99.3	Apr. 30, 1949
Payette	72	Apr. 14, 1949
Weiser	92.1	Apr. 13, 1949
KENTUCKY		
Lexington and Fayette County	96	June 23, 1950
NORTH CAROLINA		
Alexander County	73.5	Mar. 31, 1950
Avery County	73.5	July 12, 1949
Buncombe County	95	June 10, 1949
Cabarrus County	73.4	Jan. 20, 1950
Henderson County	86	Feb. 2, 1950
Wilkes County	89.7	Jan. 25, 1950
OKLAHOMA		
Ada	84	June 24, 1949
Holdenville	89	Mar. 28, 1950
Lawton	96	Feb. 20, 1950
Shawnee	96	May 25, 1949
OKLAHOMA—Con.		
Stillwater	96	July 7, 1949
Sulphur	98	Sept. 6, 1949
OREGON		
Portland	99.2	July 24, 1949
TENNESSEE		
Jackson	95.8	Mar. 30, 1950
McMinnville	95.1	May 25, 1950
Murfreesboro	98	July 27, 1949
Pulaski	91.6	May 6, 1949
TEXAS		
Brenham	92	Apr. 15, 1950
Brownsville	84.8	Mar. 20, 1950
Bryan	98.8	Feb. 12, 1949
Corsicana	99.6	Jan. 31, 1950
Edinburg	85.9	Apr. 5, 1950
Fort Worth	99.95	Feb. 4, 1950
Longview	99	July 27, 1949
Lubbock	98.2	July 15, 1949
Palestine	79.8	Apr. 28, 1949
Paris	91.8	Dec. 13, 1949
VIRGINIA		
Emporia	34	Apr. 7, 1950

NOTE: In these communities the pasteurized market milk shows a 90 percent or more compliance with the grade A pasteurized milk requirements and the raw market milk shows a 90 percent or more compliance with the grade A raw milk requirement of the Public Health Service Milk Ordinance and Code.

Note particularly the percentage of milk pasteurized in the various communities listed. This percentage is an important factor to consider in estimating the safety of a city's milk supply. All milk should be pasteurized or boiled, either commercially or at home, before it is consumed. See text for home method.

Incidence of Disease

No health department, State or local can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

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UNITED STATES

Reports From States For Week Ending July 29, 1950

For the current week in the Nation, new cases of acute poliomyelitis numbered 970, an increase over the preceding week's total for the tenth consecutive week. However, the total for the current week is less than the 1,956 cases reported for the corresponding week last year. The cumulative total number of reported cases for the current "disease" year was 4,985, less than the 7,364 cases reported for the corresponding period of last (1949–50) year, the highest year on record. The current cumulative total is also less than the 5,443 cases reported for the corresponding period in the 1948–49 "disease" year. The disease year for acute poliomyelitis begins with the twelfth week of the calendar year. The cumulative total number reported for the

Comparative Data for Cases of Specified Reportable Diseases: United States

[Numbers after diseases are International List numbers, 1948 revision]

Disease	Total for week ended		5-year median 1945–49	Seasonal low week	Cumulative total since seasonal low week		5-year median 1944–45 through 1948–49	Cumulative total for calendar year		5-year median 1945–49
	July 29, 1950	July 30, 1949			1949–50	1948–49		1950	1949	
Anthrax (062)	------	------	(1)	(1)	(1)	(1)	(1)	27	33	(1)
Diphtheria (055)	53	96	140	27th	176	280	391	3,304	4,048	6,688
Acute infectious encephalitis (082)	31	12	12	(1)	(1)	(1)	(1)	452	311	275
Influenza (480–483)	514	398	571	30th	276,789	112,137	182,373	246,259	75,807	138,815
Measles (085)	2,502	1,977	2,058	35th	301,554	636,241	578,358	282,454	583,848	543,412
Meningococcal meningitis (057.0)	50	47	54	37th	3,413	3,037	3,299	2,500	2,193	2,327
Pneumonia (490–493)	697	745	-------	(1)	(1)	(1)	--------	58,469	53,240	------
Acute poliomyelitis (080)	970	1,956	910	11th	[2] 4,985	7,364	3,699	[2] 6,119	8,279	4,166
Rocky Mountain spotted fever (104)	41	40	40	(1)	(1)	(1)	(1)	277	347	302
Scarlet fever (050)	279	207	466	32d	[2] 56,095	79,724	87,883	[2] 39,656	57,180	61,197
Smallpox (084)	-----	------	1	35th	43	49	196	23	39	142
Tularemia (059)	28	24	24	(1)	(1)	(1)	(1)	596	727	599
Typhoid and paratyphoid fever (040, 041) [3]	104	294	146	11th	1,290	1,493	1,493	1,800	1,981	1,981
Whooping cough (056)	2,630	1,592	2,428	39th	100,736	43,443	85,841	79,200	33,410	57,712

[1] Not computed.
[2] Mississippi: Deductions—week ended July 15, poliomyelitis, 2 cases; scarlet fever, 2 cases.
[3] Including cases reported as salmonellosis.

current calendar year is 6,119 compared with 8,279 reported for the corresponding period in 1949.

For the current week, all geographic divisions except the East South Central and Mountain showed increases over the preceding week. These increases ranged from 2 cases (163 to 165) in the West South Central Division to 43 cases (93 to 136) in the Middle Atlantic. The East South Central Division decreased by 27 cases (105 to 78), and the Mountain States decreased by 6 cases (22 to 16). Texas reported the largest number of cases (107); New York, the second highest (90); and Virginia, the third (82).

The 514 cases of influenza reported for the current week in the Nation ended the seasonal year for this disease. The cumulative total beginning with the 31st week of 1949 was 276,789 and is the median for the past 5 "seasonal" years. The highest total number of cases reported during this period was 552,445 in the 1945–46 season, and the lowest was 112,137 reported during the 1948–49 season.

Total reported cases of pneumonia numbered 82,939 for the "disease" year ended with this report. For the corresponding period in the previous year 73,404 cases of pneumonia were reported.

Thirty-one cases of infectious encephalitis were reported during the current week compared with 12 for the corresponding week last year. Of this total, 15 cases were reported in California and 5 in Texas. The cumulative total number of acute infectious encephalitis cases reported for the calendar year is 452 compared with the corresponding total of 311 for 1949 and the 5-year median of 275.

Reported cases of whooping cough continued to increase over the preceding week. No smallpox was reported in the United States.

Deaths During Week Ended July 29, 1950

	Week ended July 29, 1950	*Corresponding week, 1949*
Data for 94 large cities of the United States:		
Total deaths	8,284	8,931
Median for 3 prior years	8,504	
Total deaths, first 30 weeks of year	282,485	281,618
Deaths under 1 year of age	588	690
Median for 3 prior years	690	
Deaths under 1 year of age, first 30 weeks of year	18,659	19,432
Data from industrial insurance companies:		
Policies in force	69,691,785	70,309,604
Number of death claims	13,170	12,364
Death claims per 1,000 policies in force, annual rate	9.9	9.2
Death claims per 1,000 policies, first 30 weeks of year, annual rate	9.6	9.4

Reported Cases of Selected Communicable Diseases: United States, Week Ended July 29, 1950

[Numbers under diseases are International List numbers, 1948 revision]

Area	Diphtheria (055)	Encephalitis, infectious (082)	Influenza (480–483)	Measles (085)	Meningitis, meningococcal (057.0)	Pneumonia (490–493)	Poliomyelitis (080)
United States	**53**	**31**	**514**	**2,502**	**50**	**697**	**970**
New England		1	1	186		21	30
Maine				2		4	5
New Hampshire							1
Vermont				3			
Massachusetts		1		143			7
Rhode Island			1	1		3	3
Connecticut				37		14	14
Middle Atlantic	12	3	3	740	8	120	136
New York	6	3	[1] 3	275	3	80	90
New Jersey	5			274	2	23	26
Pennsylvania	1			191	3	17	20
East North Central	5	2	15	750	6	101	140
Ohio			1	125	2	14	26
Indiana	1			34		3	5
Illinois			1	188	1	38	52
Michigan	2	1	1	119	3	42	44
Wisconsin	2	1	12	284		4	13
West North Central	1	2	1	109	4	31	113
Minnesota			1	20	1	9	8
Iowa				5	2		62
Missouri				60	1	6	12
North Dakota				2		14	1
South Dakota		2					2
Nebraska	1			14		1	14
Kansas				8		1	14
South Atlantic	16		98	107	10	85	197
Delaware				2			4
Maryland	8		3	17		32	9
District of Columbia			1	1		11	9
Virginia			76	34	5	21	82
West Virginia			6	11		2	13
North Carolina	3			21	3		30
South Carolina	3		11	2	2	5	34
Georgia	2		1	1		3	8
Florida				18		11	8
East South Central	4	1	11	66	7	48	78
Kentucky				30	2	12	34
Tennessee	1		7	9	2		13
Alabama	2	1	2	18	2	25	18
Mississippi	1		2	9	1	11	13
West South Central	14	6	340	125	10	202	165
Arkansas			15	10	1	13	23
Louisiana	2			5	1	21	10
Oklahoma	1	1	12	5	1	11	25
Texas	11	5	313	105	7	157	107
Mountain		1	37	184	2	56	16
Montana			11	4		1	2
Idaho			4	14	1		3
Wyoming				2		5	1
Colorado			5	90		10	6
New Mexico			3	16		22	2
Arizona		1	14	8	1	15	2
Utah				50		2	
Nevada						1	
Pacific	1	15	8	235	3	33	95
Washington				18	1		20
Oregon	1		6	13		3	8
California		15	2	204	2	30	67
Alaska							
Hawaii					1		1

[1] New York City only.

Reported Cases of Selected Communicable Diseases: United States, Week Ended July 29, 1950—Continued

[Numbers under diseases are International List numbers, 1948 revision]

Area	Rocky Mountain spotted fever (104)	Scarlet fever (050)	Smallpox (084)	Tularemia (059)	Typhoid and paratyphoid fever (040,041)[1]	Whooping cough (056)	Rabies in animals
United States	41	279		28	104	2,630	116
New England		31			1	295	
Maine		1				53	
New Hampshire						4	
Vermont						36	
Massachusetts		27			1	122	
Rhode Island		1				36	
Connecticut		2				44	
Middle Atlantic	3	42			11	316	36
New York		[2] 26			5	141	32
New Jersey	3	5			1	102	
Pennsylvania		11			5	73	4
East North Central	4	87			5	552	10
Ohio		21				98	3
Indiana	3	3			1	21	
Illinois	1	13			2	93	2
Michigan		39			1	205	5
Wisconsin		11			1	135	
West North Central		14			2	269	4
Minnesota		4				61	
Iowa		1				99	4
Missouri		3			1	62	
North Dakota						4	
South Dakota						7	
Nebraska		2				8	
Kansas		4			1	28	
South Atlantic	22	30		4	28	329	18
Delaware		1				3	
Maryland	6	2				45	
District of Columbia		1				3	
Virginia	7	9		2	4	72	3
West Virginia					4	47	1
North Carolina	8	9		1	6	106	
South Carolina					5	9	6
Georgia	1	8		1	8	11	8
Florida					1	33	
East South Central	6	20		2	19	122	27
Kentucky		10			7	60	16
Tennessee	4	7			7	37	5
Alabama	2	1			2	19	6
Mississippi		2		2	3	6	
West South Central	3	16		18	22	397	19
Arkansas	2	2		13	3	15	2
Louisiana				1	6	7	
Oklahoma	1	1		1	2	20	2
Texas		13		3	11	355	15
Mountain	3	5		4	6	160	
Montana	1	2		3		20	
Idaho	1	1			3	18	
Wyoming	1					3	
Colorado		1			1	21	
New Mexico		1			1	26	
Arizona					1	57	
Utah				1		15	
Nevada							
Pacific		34			10	190	2
Washington		8			2	49	
Oregon		3			1	43	
California		23			7	98	2
Alaska						9	
Hawaii						3	

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[1] Including cases reported as salmonellosis.

[2] Including cases reported as streptococcal sore throat.

FOREIGN REPORTS

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

Burma. During the week ended July 8, 1950, 66 cases of cholera, with 53 deaths, were reported in Burma. One case was reported in the port of Toungoo during the week ended July 1.

India. According to information dated July 21, 1950, an outbreak of cholera is occurring in Bombay. As of that date 171 new cases, 9 deaths, had been reported since July 16.

Indochina (French). During the week ended July 1, 1950, one fatal case of cholera was reported in the Thudaumot rural area, Viet Nam.

Plague

Belgian Congo. Plague has been reported in Stanleyville Province, as follows: Week ended July 8, 1950, one fatal case at Antonio, northeast of Blukwa; week ended July 15, one fatal case at Govi, north of Blukwa.

Indochina (French). On July 13, 1950, one fatal case of plague was reported at Govap, Cochinchina.

Smallpox

Argentina. During the month of May 1950, 164 cases of smallpox were reported in Argentina, including 52 cases in Buenos Aires Province, 14 in Corrientes Province, 11 in San Luis Province, 40 in Rio Negro Territory, and 22 in Neuquen Territory.

Cameroon (British). During the week ended June 10, 1950, 30 cases of smallpox were reported.

Indonesia. Information dated July 17, 1950, states that the epidemic of smallpox which began in Surabaya, Java, the last week in February 1950, when 21 cases were reported for that week, showed no sign of abatement as of June 29. Through the week ended June 24, 1,751 cases, with 509 deaths, had been reported. No figures for the week ended July 1 have been received, but 184 cases were reported for the week ended July 8. In Pontianak, Borneo, 16 cases, 5 deaths, were reported for the week ended June 17, and 19 cases, 9 deaths, for the week ended June 24.

Typhus Fever

Jamaica. During the week ended July 15, 1950, 3 cases of typhus fever (murine type) were reported in Kingston.

Spain. During the week ended June 17, 1950, nine cases of typhus fever, one fatal, were reported in Malaga Province.

Yellow Fever

Cameroon (*French*). The fatal suspected case of yellow fever reported on July 6, 1950, in Foumban Region (see PUBLIC HEALTH REPORTS, August 4, 1950, p. 1001) was not confirmed.

State and Territorial Health Officers
1950 Meeting

The 49th Annual Conference of the Surgeon General of the Public Health Service and the Chief of the Children's Bureau with the State and Territorial Health Officers, State Mental Health Authorities, and State Hospital Survey and Construction Authorities will be held in Washington, D. C., Monday through Friday, October 23 to 27, 1950. This year the State and Provincial Health Authorities will participate in the program, which includes a two-day scientific session to be held Tuesday and Wednesday, October 24 and 25, at the National Institutes of Health, Bethesda, Md.

Plans and arrangements for this conference, which is held in conjunction with the annual meeting of the Association of State and Territorial Health Officers, are being coordinated by the Division of State Grants in the Bureau of State Services.

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The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, Public Health Service, Washington 25, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington 25, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

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PUBLIC HEALTH SERVICE
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Two Surveys of Methods Used by Public Health Laboratories for the Examination of Stool Specimens for *Salmonellae*, *Shigellae*, and Protozoa

By Oscar Felsenfeld, M. D.*

In order to ascertain which methods are generally used for the examination of stool specimens, questionnaires were sent out during the winter of 1944 and spring of 1945 to the laboratories of 48 States, the District of Columbia, Hawaii, Alaska, and Puerto Rico. Complete answers were received from 40 laboratories. Incomplete information was available from 12 more sources. The survey showed that no two laboratories use exactly the same procedures. This survey was repeated 5 years later in 1949 when questionnaires were sent to the same public health laboratories as in 1944. This time, the complete answers received from 46 sources and the incomplete returns from 6 more laboratories again showed a great variance in the methods used. Both surveys are reported here.

The first question on the form sent to the laboratories concerned

Table 1. *Methods of collecting specimens for bacteriologic and parasitologic stool examination recommended, permitted, and refused by public health laboratories*

Specimen	For bacteriologic examination						For protozoologic examination					
	Recommended		Permitted		Refused		Recommended		Permitted		Refused	
	1944	1949	1944	1949	1944	1949	1944	1949	1944	1949	1944	1949
Fresh stools, promptly delivered	42	36	[1] 2	[2] 11	0	0	42	30	1	4	0	0
Postcathartic stools	12	[3] 11	6	23	0	0	12	[4] 11	6	15	0	0
Enema specimens	X	1	X	23	X	3	X	0	X	16	X	6
Proctoscopic specimens	8	5	3	[1] 23	1	3	10	[4] 7	3	12	3	2
Rectal swab	[5] 13	[5] 13	11	[5] 31	1	3	0	0	7	12	11	5
Material collected on finger cot	0	0	6	[1] 23	2	4	0	0	6	9	2	9

[1] 1 laboratory: for dysentery only.
[2] 3 laboratories: preserved specimens preferred.
[3] 2 laboratories: preferred to fresh specimens.
[4] 2 laboratories: after repeated negative, fresh specimens.
[5] 2 laboratories: in dysentery; 1 laboratory: in children.
X=Question not asked in 1944.

*Director of Bacteriology, The Hektoen Institute for Medical Research of the Cook County Hospital Chicago 12, Ill. This survey was supported by a grant from the Mollie Netcher Newbury Research Fund.

the methods used for the collection of the stool specimens (table 1). Information on the collection of specimens for bacteriologic examination was received from 50 laboratories in both surveys, while on protozoologic studies data were received from 40 in 1944, and from 44 laboratories in 1949. Twenty-three laboratories in 1944 and 16 in 1949 recommended more than one method for bacteriologic examination; 24 laboratories in 1944 and 4 in 1949 recommended more than one method for parasitologic studies.

The second question concerned methods used for the preservation of specimens for mailing. There were no inquiries regarding preservatives for protozoa in 1944. Fifty answers were available in 1944 and 46 in 1949 on bacteriologic examination (table 2). Four laboratories in 1949 had no preference. During both surveys, two laboratories recommended two methods.

Table 2. *Methods of preserving specimens for bacteriologic and parasitologic stool examination recommended, permitted, and refused by public health laboratories*

Examination	Preservative	Recommended		Permitted		Refused	
		1944	1949	1944	1949	1944	1949
Bacteriologic	Buffered glycerol-saline	21	29	19	6	0	0
	Unbuffered glycerol-saline	1	7	X	XX	X	XX
	Glycerol-saline with phenol red	X	1	X	XX	X	XX
	Buffered glycerol-water	X	1	X	XX	X	XX
	Lithium chloride glycerol	X	1	X	XX	X	XX
	Alkaline lithium chloride	0	1	0	0	1	1
	Selenite–F	X	1	X	XX	X	XX
	Desoxycholate-citrate	3	3	3	15	2	3
	Bile-peptone	3	0	0	15	2	5
	Alkaline bile	1	2	0	17	3	6
	No preservative for bacteriologic examination	3	2	3	2	0	1
Parasitologic	10 percent formalin	1	7	X	10	X	4
	Schaudinn	X	5	X	12	X	3
	P. V. A.-fixative	X	12	X	7	X	4
	No preservative for protozoologic examination	X	18	X	0	X	1

X=Question not asked in 1944.
XX=Question not asked in 1949.

A preservative for protozoa was recommended by only 24 laboratories in 1949. The others did not comment or indicate a preference for fresh stools.

Media used for the plating and primary identification of *Salmonellae* and *Shigellae* were the subject of the next question. Answers were received from 44 laboratories in 1944 and from 50 in 1949. In 1944 only three and in 1949 only two laboratories used exactly the same combination of enrichment fluids and plating media. For the statistical evaluation, occasionally used tubes or plates were considered as a one-half tube or plate. The same method of accounting served for the evaluation of the number of media used by laboratories which follow different procedures for the detection of *Salmonellae* and of *Shigellae*. Five laboratories in each survey reported that they ap-

Table 3. *Combinations of enrichment media and number of plates used for indirect and direct streaking of stool specimens in public health laboratories*

Enrichment medium	Total laboratories		Plates streaked from each tube (indirect streaking)[3]													
			0–½		1–1½		2–2½		3–3½		4		5		6–9	
	1944	1949	1944	1949	1944	1949	1944	1949	1944	1949	1944	1949	1944	1949	1944	1949
All combinations	44	50	4	3	5	7	16	18	11	10	5	10	3	----	----	2
None	4	2	4	2	----	----	----	----	----	----	----	----	----	----	----	----
1 tube tetrathionate broth (Mueller)	[1]10	[1]16	----	----	1	3	5	5	2	5	1	3	1	----	----	----
2 tubes tetrathionate broth (Mueller)	1	----	----	----	----	----	----	----	1	----	----	----	----	----	----	----
3–4 tubes tetrathionate broth (Mueller)	1	----	----	----	----	----	----	----	1	----	----	----	----	----	----	----
1 tube tetrathionate broth (Mueller), 1 tube Kauffman's broth	1	----	----	----	----	----	1	----	----	----	----	----	----	----	----	----
1 tube tetrathionate broth (Mueller), 1 tube selenite F	[1]8	[1]5	----	1	1	----	3	1	2	1	1	1	1	----	----	1
1 tube tetrathionate broth (Mueller),[2] 1 tube Kauffman's broth,[2] 1 tube selenite F	2	----	----	----	----	----	1	----	1	----	----	----	----	----	----	----
1 tube tetrathionate broth (Mueller), 1 tube desoxycholate-citrate broth (Bangxang and Elliot and modifications),[2] 1 tube selenite F.[2]	----	1	----	----	----	----	----	1	----	----	----	----	----	----	----	----
1 tube Kauffman's broth	1	2	----	----	----	1	1	1	----	----	----	----	----	----	----	----
1 tube Kauffman's broth, 1 tube selenite F	[1]1	[1]1	----	----	1	----	----	1	----	----	----	----	----	----	----	----
1 tube desoxycholate-citrate broth (Bangxang and Elliot and modifications)	1	2	----	----	----	----	----	----	----	----	1	2	----	----	----	----
1 tube selenite F	[1]12	[1]18	----	----	2	3	5	9	4	4	1	2	----	----	----	----
2 tubes selenite F	1	2	----	----	----	----	----	----	----	----	1	1	----	----	----	1
3 tubes brilliant green-bile	1	----	----	----	----	----	----	----	----	----	----	----	1	----	----	----
1 tube buffered glycerol-saline	----	1	----	----	----	----	----	----	----	----	----	1	----	----	----	----
			Plates streaked from each stool specimen directly[3]													
All combinations	44	50	----	*2	----	2	11	14	13	14	8	13	7	1	5	4
None	4	2	----	----	----	----	1	1	3	----	----	----	----	----	----	1
1 tube tetrathionate broth (Mueller)	[1]10	[1]16	----	----	----	----	3	4	3	4	1	8	3	----	----	----
2 tubes tetrathionate broth (Mueller)	1	----	----	----	----	----	----	----	----	----	1	----	----	----	----	----
3–4 tubes tetrathionate broth (Mueller)	1	----	----	----	----	----	----	----	----	----	----	----	----	----	1	----
1 tube tetrathionate broth (Mueller), 1 tube Kauffman's broth	1	----	----	----	----	----	----	----	----	----	----	----	----	----	1	----
1 tube tetrathionate broth (Mueller), 1 tube selenite F	[1]8	[1]5	----	----	----	1	1	1	2	1	1	1	3	----	1	1
1 tube tetrathionate broth (Mueller),[2] 1 tube Kauffman's broth,[2] 1 tube selenite F	2	----	----	----	----	----	----	----	1	----	1	----	----	----	----	----
1 tube tetrathionate broth (Mueller), 1 tube desoxycholate-citrate broth (Bangxang and Elliot and modifications),[2] 1 tube selenite F.[2]	----	1	----	1	----	----	----	----	----	----	----	----	----	----	----	----
1 tube Kauffman's broth	1	2	----	----	----	----	----	1	1	1	----	----	----	----	----	----
1 tube Kauffman's broth, 1 tube selenite F	[1]1	[1]1	----	----	----	----	1	----	----	----	----	1	----	----	----	----
1 tube desoxycholate-citrate broth (Bangxang and Elliot and modifications)	1	2	----	1	----	----	1	----	----	1	----	----	----	----	----	----
1 tube selenite F	[1]12	[1]18	----	----	----	----	4	7	3	7	3	3	1	----	1	1
2 tubes selenite F	1	2	----	----	----	1	----	----	----	----	1	----	----	----	----	1
3 tubes brilliant green-bile	1	----	----	----	----	----	----	----	----	----	----	----	----	----	1	----
1 tube buffered glycerol-saline	----	1	----	----	----	----	----	----	----	----	----	----	----	1	----	----

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[1] Includes laboratories which use the medium only occasionally.
[2] The tube is used in that combination only occasionally.
[3] One-half, with the exception of column marked * stands for "one additional plate occasionally."

Table 4. *Selection of plating media for indirect and direct plating of stool specimens for bacteriologic examination by State health laboratories*

Medium	For indirect plating											
	Occasionally		Routinely								Together	
			Alone				In combination					
			1 plate		More plates		1 plate		More plates			
	1944	1949	1944	1949	1944	1949	1944	1949	1944	1949	1944	1949
Endo	------	------	------	------	------	------	4	1	1	1	5	2
E. M. B	------	------	------	------	------	------	3	1	1	3	4	4
McConkey	------	------	------	------	------	1	9	13	6	3	15	17
Desoxycholate	------	------	------	------	------	------	1	3	2	------	3	3
D. C. L. S.[2]	------	------	------	------	------	------	------	4	------	------	------	4
S. S	6	2	2	4	1	------	18	18	12	12	39	36
D. C	4	------	------	1	------	1	6	1	5	2	15	5
Brilliant green	------	------	1	------	------	------	1	3	------	3	2	6
BiS streak	1	3	------	1	------	------	12	17	11	7	24	28
BiS pour	------	------	------	------	------	------	2	5	1	4	3	9

Medium	For direct plating[1]									
	Occasionally		Routinely						Together	
			Alone, 1 plate		In combination					
					1 plate		More plates			
	1944	1949	1944	1949	1944	1949	1944	1949	1944	1949
Endo	1	1	------	------	9	5	------	------	10	6
E. M. B	------	1	------	------	8	6	3	3	11	10
McConkey	1	1	------	1	13	20	2	2	16	24
Desoxycholate	1	1	------	------	7	5	------	------	8	5
D. C. L. S.[2]	------	1	------	------	------	3	------	------	------	4
S. S	2	------	------	------	30	34	3	8	35	42
D. C	1	1	------	------	10	3	2	2	13	6
Brilliant green	------	------	------	------	------	4	1	------	1	4
BiS streak	2	3	------	------	28	25	3	3	33	31
BiS pour	1	1	------	------	3	4	3	4	7	9

[1] No laboratories used more than 1 plate except in combinations.
[2] Introduced after 1945.
E. M. B.=Eosin methylene blue plate.
D. C. L. S.=Desoxycholate citrate-lactose-sucrose plate, B. B. L.
S. S.=*Salmonella-Shigella* plate, Difco.
D. C.=Desoxycholate-citrate plate, B. B. L.
Brilliant green=Brilliant green-phenol red plate.
BiS streak=All forms of the Wilson-Blair plate, streaked.
BiS pour=All forms of the Wilson-Blair plate, poured.

plied different media in such cases, while all other laboratories used one procedure for the isolation of bacteria belonging to both genera.

The groups of media were listed according to the enrichment tubes employed at the same time. Plating media were divided into those used for streaking from the enrichment fluids (indirect plating) and those used for inoculation directly from the specimens (direct plating).

Tables 3 and 4 show the great variety of media employed by the laboratories.

Table 5 demonstrates the use of primary differentiating media.

Table 5. *Primary differentiating media used in the diagnosis of* Salmonellae *and* Shigellae *by public health laboratories*

Medium	Routinely used		Occasionally used		Together	
	1944	1949	1944	1949	1944	1949
Russell	12	4	4	3	16	7
Russell with Andrade's indicator	1	1	0	1	1	2
Kligler	16	19	12	2	28	21
Mickle	3	2	5	0	8	2
Krumwiede	12	7	6	4	18	11
T. S. I.	1	17	4	3	5	20
Friewer-Shaughnessy	1	1	0	1	1	2
M T. I.	X	1	X	1	X	2
Lactose broth	1	2	0	2	1	4
Lactose-sucrose broth	X	2	X	0	X	2
Brom cresol purple plate	1	0	0	0	1	0

X=Not asked in 1944.

Only 20 laboratories out of 43 in 1944 but 40 out of the 48 laboratories answering this question in 1949 used a single primary differentiating medium routinely. One of the laboratories each in 1944 and in 1949 had no preference for any medium.

Table 6 shows the answers to the question on the final serologic classification of *Salmonellae* and *Shigellae.* Information was available in 1944 from 47, and in 1949 from 49 laboratories.

Table 7 contains the answers to the question on methods used for the detection and identification of *Endamoeba histolytica.* Forty laboratories cooperated in 1944 and 46 in 1949. Two laboratories each in 1944 and 1949 did not examine direct smears at all.

Further answers concerned questions not pertaining to the actual work in the public health laboratories. They were, nevertheless, considered essential to complete the picture of the present state of enteric work.

Table 8 shows the evaluation of organisms of questionable pathogenicity. Forty-four laboratories answered the question in 1944 and 46 in 1949.

Table 6. *Extent of the use of serologic methods (typing) for the diagnosis of* Salmonellae *and* Shigellae *in public health laboratories*

Serologic tests	*Salmonellae*		*Shigellae*	
	1944	1949	1944	1949
Not typed at all	7	2	6	5
Typhoid alone typed, others not	1	1	--------	--------
Typhoid and paratyphoid A and B typed, others not	7	2	--------	--------
Groups determined	--------	--------	7	6
Typhoid typed, others sent to center	0	2	--------	--------
Typhoid and paratyphoid A and B typed, others sent to center	3	4	--------	--------
Groups typed, others sent to center	8	16	7	11
All suspicious organisms sent to center	2	10	2	7
Complete typing performed locally	16	10	22	18
No set policy	3	2	3	2
Total	47	49	47	49

Table 7. *Preference for procedures used in the detection of* Endamoeba histolytica *in public health laboratories*

Method	Routinely		Occasionally		Together	
	1944	1949	1944	1949	1944	1949
Direct examination of saline suspension	34	33	2	6	36	39
Direct examination of iodine tinged suspension	32	36	2	5	34	41
Quensel stain	X	4	X	9	X	13
Zinc sulfate flotation	6	35	1	9	7	44
Salt flotation	0	5	1	2	1	7
Permanent hematoxylin slides	12	20	4	23	16	43
Culture methods	2	4	0	10	2	14

X=Question not asked in 1944.

The ninth question was: What happens if only organisms of doubtful pathogenicity are isolated from the stools? Forty-four laboratories answered this question in 1944 and 49 in 1949. In 1944, nine stated that the physician treating the case had to decide if the disease was caused by the "doubtful" organism; in 17 States the public health authorities alone were considered competent to settle the question; in 15 the physician treating the patient and the public health authorities together made the decision, and three had no set policy. In 1949, in 16 States the physician on the case alone decided whether the organism reported by the laboratory was to be considered pathogenic; in one the public health authorities made the decision alone; and in 26 the physician and the public health authorities together resolved the problem. Six States had no set policy.

The final question considered the approval of private laboratories for enteric work. Data were available in 1944 from 44, and in 1949

Table 8. *Attitude toward organisms from stools of "doubtful" pathogenicity in public health laboratories*

Organism	Considered						No comment	
	Pathogenic		Doubtful		Nonpathogenic			
	1944	1949	1944	1949	1944	1949	1944	1949
S. alkalescens	2	9	2	20	30	7	10	10
S. dispar	6	9	4	20	23	8	11	9
Protei	3	[1,2] 6	0	[3] 16	31	14	10	10
Paracolobactra	1	3	0	[4] 22	30	9	13	12
A. faecalis	0	[1] 1	0	11	32	20	12	14
E. nana	1	[5] 4	0	7	30	22	13	13
D. fragilis	0	[5] 5	2	9	29	17	13	15
Chilomastix	1	2	0	7	30	15	13	22
Embadomonas	1	1	0	10	30	18	13	17
Enteromonas	0	1	0	9	31	18	13	18
Enterococci	X	[2] 2	X	16	X	10	X	18

[1] 1 laboratory: in infants.
[2] 1 laboratory: in food poisoning.
[3] 1 laboratory: *Pr. morgani* pathogenic.
[4] 3 laboratories: certain strains (1 laboratory: the Bethesda group).
[5] 1 laboratory: when heavy infestation present.

X=Question not asked in 1944.

from 44 States, the District of Columbia, and Territories. Seven States in 1944 and eight States in 1949 (California, Connecticut, Massachusetts, Michigan, New Jersey, New York, South Dakota, and Wisconsin) granted formal approval to private laboratories to perform enteric work. In addition, two States in 1944 and one in 1949 issued certificates of approval but only to hospital laboratories. Three public-health laboratories in 1944 and 17 in 1949 stated that although formal approval under a law or regulation does not exist, they are assisting or willing to assist private laboratories interested in enteric work.

Discussion

A great variety of methods are used by public-health laboratories for the collection and shipping of stool specimens as well as for the isolation and identification of *Salmonellae*, *Shigellae* and *Endamoeba histolytica*. The statistical evaluation of the collected data is difficult because of the diversity of methods and attitudes. There is, however, an increasing tendency toward greater liberalism, especially in procedures with patients, private physicians, and other laboratories. This is revealed, among other ways, by the increased acceptance of specimens collected and preserved by different methods.

The leading method of stool collection is that of fresh specimens promptly received. With the exception of three laboratories, which prefer preserved stools, such material is generally accepted. Between 1944 and 1949 the number of laboratories listing "permitted" methods in addition to "recommended" means of stool collection significantly increased. Of special interest are answers from two laboratories in 1949 which recommended proctoscopic specimens to be examined for protozoa when fresh stools were found negative. This requires the aid of a proctologist and thus shows the increasing trend toward cooperation with the medical profession.

Glycerol-saline is the most frequently recommended preservative for bacteria. Here again more laboratories checked several preservatives as "permitted" than in 1944, demonstrating a growing liberal tendency.

In spite of its newness, the polyvinyl alcohol-fixative method (*1*) is as often recommended for the preservation of intestinal protozoa as the other two means, i. e., formol and Schaudinn's fluid, together. This indicates the progressiveness of many public health laboratories which try to profit from newest developments in the field. In addition, the story of this fixative shows that the coordinating services and the assistance provided by the Public Health Service are being more and more accepted and utilized.

Between 1944 and 1949 a reduction occurred in the number of media used for the plating of stool specimens. If the data contained in table 3 are grouped further, a significant difference may be found between the number of laboratories using four or more and those using less than four plates for direct plating of the specimens in 1944 and in 1949 ($P<.05$), while there is no statistically significant difference between the number of plates streaked from the enrichment tubes (indirect plating). The modal classes remained the same in both surveys: two plates streaked from one tube of enrichment fluid and, from the same specimen, three or occasionally four plates streaked directly.

There was a significant shift from tetrathionate broth to Selenite-F enrichment. S.S. agar is the most popular plating medium. It is used especially frequently for direct plating. There was a decrease in the use of Endo's medium. Desoxycholate agar and its derivative, the D.C.L.S. medium, are more frequently used than Endo's plate. MacConkey's agar and the brilliant green-phenol red medium had more advocates in 1949 than in 1944. The same can be said about poured bismuth sulfite plates, while the use of streaked bismuth sulfite media showed a decrease if occasional use is not considered. In 1944, seven laboratories prepared their own bismuth sulfite plates, but in 1949 all but three used desiccated bismuth sulfite medium. These changes point toward evaluation of experience and economizing in public health laboratories.

Kligler's primary differentiating tube, which had the most advocates in 1944, seems to be replaced by the triple sugar-iron agar (*2*) in many laboratories. The decrease in the number of laboratories using Russell's, Mickle's, and Krumwiede's tubes is ascribed to the spreading popularity of the triple sugar-iron agar. The increased use of a single differentiating medium shows a trend toward standardization of the laboratory technique. The fast growing popularity of Hajna's tube proves again the rapid acceptance of recent advances by public health laboratories.

Due to the establishment of new typing centers, significantly fewer laboratories carry out the serologic identification of the organisms they isolate. In 1949, 28 public health laboratories stated that they are using the services of the *Salmonella* and *Shigella* typing center of the Public Health Service in Atlanta, Georgia. This practice shows an increasing cooperation with the Public Health Service as well as the need for this coordinating establishment and additional ones.

Flotation methods for the diagnosis of protozoa are widely used This is probably due to evaluation of experience and economic trends. Hematoxylin stained slides are examined in the majority of the laboratories, although only occasionally in many of them. The spread of this valuable diagnostic method has resulted from the introduction of the polyvinyl alcohol-fixative which allows the transportation of preserved stools both in bulk and on slides. Diagnostic culture methods for amebas are also being used on a larger scale, at least occasionally. This shows an effort to improve standard diagnostic means.

The answers to the question concerning the role of organisms of doubtful pathogenicity revealed that most laboratories follow contemporary literature carefully and try to adjust their attitudes accordingly, although they have the same doubts as all other workers specialized in this field. There is a strong trend toward cooperation with the practicing physician, revealing itself in a greater tendency to decide together with the "man on the case" about the etiology of diarrhea. There seems to be a general trend to admit the possible pathogenicity of organisms formerly considered nonpathogenic or "doubtful."

Public health laboratories also extend a helping hand to private establishments which are interested in enteric work. The number of States willing to assist nonpublic laboratories increased significantly.

Finally, this writer performed experiments to establish a minimal series of media necessary to isolate the *Salmonellae* and *Shigellae* which are most frequent in the United States (*3*). Only two laboratories in 1944 and one in 1949 of those which cooperated in this survey used methods which have a probability of less than 0.95 to detect common *Salmonellae* and *Shigellae* from the stools. Thus the choice of methods is satisfactory from the statistical point of view and should bring good results provided that the technique of the workers engaged in stool examination is also satisfactory.

Summary

Surveys of the methods used for the collection and preservation of stool specimens, and the isolation and identification of *Salmonellae*, *Shigellae*, and intestinal protozoa were carried out in 1944 and 1949. An inquiry was made into the attitude of the laboratories toward the so-called doubtful pathogens and the approval of private laboratories. The results are given in tabulations.

ACKNOWLEDGMENT

The writer is much indebted to all public health laboratories which cooperated during these surveys and patiently answered questionnaires and letters.

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The Role of Morbidity Reporting and Case Registers in Cancer Control

By SIDNEY J. CUTLER*

That no community can effectively prevent or control disease without knowledge of the number, location, and characteristics of cases is generally accepted. Information on the incidence of new cases is needed to prevent the spread of a communicable disease. Data on the relative incidence of a disease in various segments of the population are necessary for planning a productive and economical case-finding program. Information on the total number of persons with a disease is required for evaluating the adequacy of community resources.

This information may be collected either through the operation of a routine reporting system or by means of periodic surveys and special studies. Routine reporting of all known cases in a community is generally accepted as a useful tool in the control of certain acute communicable diseases. Cases are reported so that appropriate action may be taken by the health department to prevent the spread of disease. The statistics obtained through the operation of the reporting system are essentially by-products of the control program. In chronic disease control, routine reporting of all known cases can be justified only if service is to be given. If the primary purpose is to make statistical studies, the necessary data can be collected more economically and more efficiently by means of special investigations. Chronic disease incidence rates probably do not change rapidly enough to necessitate the continuous collection of data. Trends may be analyzed by repeating the investigation periodically. In addition, special studies will probably yield more accurate and more comprehensive data than a routine reporting system which is not an integral part of a service program.

Records of one type or another are kept in connection with every service program. These records are generally intended to: (1) facilitate service—by identifying the individual being served, indicating the nature and status of the case, providing a record of services given, and scheduling activity; and (2) facilitate program planning and evaluation—by providing measures of the number of persons served, the number and types of services given, and the effectiveness with which service is provided.

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Service records ordinarily cannot be used as a source of information concerning the magnitude and nature of a community disease problem. However, if a community disease control program is intended to provide service to a large proportion of persons with a particular disease, it may be desirable to combine the maintenance of service records with the collection of morbidity data into one operation. A case register is one type of record system which readily lends itself to use in a dual capacity, both as an administrative tool in a service program and as a source of morbidity data.

Case Register

A case register may be defined as a record system which is used as an administrative tool in a service program, and which includes a continuous case history in abstract form and a mechanism for scheduling follow-up. It is intended to:[1]

1. Identify the individuals being followed in the specific program for which the register is maintained.
2. Ascertain the status of individual cases.
3. Assure follow-up directed towards continuity of care.
4. Make available statistics for planning and evaluating the service program.

The cases to be included in the register will be determined by the nature and scope of the service program. The register may be restricted to selected groups of cases, such as patients seen in one clinic, one hospital, or a group of medical facilities; patients under home nursing care; or patients receiving financial assistance. A case register should properly include all diagnosed cases in a community only if all of these cases are to be followed for an extended period and some form of service is to be given.

A case register can provide useful operational statistics, irrespective of its coverage. However, if it is to be used also for the collection of morbidity data, due consideration should be given to the type of statistics to be compiled and the representativeness of the cases included in the register. If a register is to be used to obtain information concerning the incidence and prevalence of a disease, it should contain a record on every diagnosed case among residents of a community of known size and composition. If a register is to be used for making generalizations concerning the characteristics of persons with a disease, the relative importance of various diagnostic classes, methods of diagnosis and therapy, or survival and cure, then the cases included in the register must be representative of the population about which generalizations are to be made.

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[1] The definition and statement of purpose are in essential agreement with the recommendations made by the Working Group on Case Registers at the second annual meeting of the Public Health Conference on Records and Statistics, Washington, D. C., April 24-27, 1950.

Community Case Register

A case register which includes a record on all cases diagnosed in a community of known size and composition can be used not only as an integral part of a service program but also as a source for a wide variety of morbidity data. For the sake of convenience this type of record system is referred to as a "community case register." If the scope of a disease control program warrants the maintenance of a record on every diagnosed case in a particular area, a community case register can be a very useful tool. The contributions it can make to a number of basic elements of a cancer control program are indicated below. It is felt, however, that the principles worked out in cancer control are generally applicable to chronic diseases, such as diabetes, heart disease, and so forth.

Program Planning and Evaluation

The case register provides a basis for answering the question: What are the magnitude and nature of the cancer problem? The answer may be found in data abstracted from reported cases pertaining to: (a) the number of new cases diagnosed (incidence); (b) the number of cases with cancer as of a specified date or during a specified time period (prevalence); (c) the demographic characteristics and geographic distribution of persons with cancer; and (d) primary site and stage at diagnosis. The register may be used for determining community requirements for different types of medical facilities, such as clinics, hospital beds, nursing and terminal care homes. Data on number of cases classified by geographic location and source of medical care are useful in evaluating the adequacy of available diagnostic and treatment facilities and for planning the location and capacity of new facilities. Data on number of cases classified by geographic location and primary site are useful in evaluating the efficacy of various preventive aspects of the cancer control program.

Professional and Lay Education

Information made available by the community case register provides material for use in professional and lay education programs. Professional interest in a cancer control program can be aroused and maintained by bringing information utilized in planning the program and in evaluating its progress to the attention of the physicians in the community. Of special interest may be information pertaining to primary site, method of diagnosis, therapy, and end results. Public awareness can best be aroused by indicating the size of the cancer problem, the importance of early and accurate diagnosis, and the need for adequate and continuous medical care.

Case Finding, Diagnostic and Treatment Services

The routine operation of the morbidity reporting system provides quantitative measures for evaluating:

(a) The results of educational and case-finding activities—by examining trends in stage at diagnosis;

(b) Progress in the utilization of accepted diagnostic techniques—by analyzing reported cases with respect to method of diagnosis;

(c) Success of case holding—by determining the proportion of cases returning for reexamination or treatment at regular intervals; and

(d) Efficacy of various therapeutic techniques—by analyzing survival and cure.

Nursing and Follow-up Services

One technique for using a community case register to facilitate nursing and follow-up services to cancer patients is indicated:

(a) Information on each case in the register is readily available to the public health nurse or medical social worker who can check on the patient's history and current status before contacting the physician or the patient.

(b) Each newly reported case is routinely followed up. A nurse or social worker calls the responsible physician and asks whether he would like her to visit his patient. This procedure helps remind physicians of services available to their patients and helps get necessary service to the patient promptly.

(c) Case records are signalled to indicate dates on which periodic follow-up questionnaires are to be sent to physicians and clinics. In addition to serving as a means for keeping records up to date, these questionnaires tend to stimulate physicians and clinics to follow up delinquent patients. Thus, the routine operation of the system is indirectly instrumental in improving the quality of case holding.

(d) If a physician indicates on the periodic follow-up report that the patient has not been in for his regular check-up, the case is referred to the nursing section. A nurse calls the physician and offers to contact the patient for him. Patients can thus be brought back under medical supervision.

Special Studies

The register provides a basis for the selection of cases for intensive investigation of selected problems, e. g., epidemiological studies, analysis of the financial impact of the disease on the family, etc. The information necessary for carrying out such special studies is usually detailed and complex and should not be routinely collected as part of the regular reporting system. Inclusion of the necessary items would make the reporting forms unduly extensive and complicated. Experience has demonstrated that extensive or complicated reporting forms will not be completed accurately and that resistance to reporting increases rapidly as forms become increasingly complicated. However, the information contained in the register affords a means for selecting cases to be included in special sample studies.

Operation Level and Completeness of Records

In order to function as an integral part of a cancer control program, a community case register should be maintained at the operating level of the program. This will usually be the local community. Appropriate information may be forwarded to the State health department for the compilation of statistics and the maintenance of a clearance system. A register that is maintained at the State level ordinarily will not be effective in promoting follow-up and service to the patient.

To serve as a source of information concerning the magnitude and nature of a community cancer problem, a community case register should contain a record on every case of cancer diagnosed among residents of a specified area. The full value of morbidity reporting can be obtained only by relating the number of cases to the population from which they are drawn through the computation of rates per unit of population (incidence, prevalence and mortality rates). To draw reliable conclusions from computed rates, morbidity reporting must be complete.

To achieve completeness, the reporting system should cover every physician, hospital, clinic, and medical facility. A reporting system in which coverage is not complete will result not only in an incomplete count of cases but may also make for unrepresentative data. It should also be borne in mind that incomplete coverage of medical facilities tends to defeat one of the principal objectives of morbidity reporting as an instrument in cancer control, namely, to obtain information concerning living cases at the earliest possible stage in the development of the disease.

Death certificates should be routinely checked for unreported cases. Completeness of reporting can thus be checked at the same time that a more complete count is obtained. Official mortality records should also be used for clearing dead cases from the active file.

Pitfalls in the Operation of a Community Case Register

Although a community case register is a very useful tool, experience has shown that it may degenerate into a file of records to which nobody refers except the clerk responsible for keeping it up to date. The records are not utilized as a basis for action on particular cases and it soon becomes apparent that the data derived from these records are neither complete nor accurate and therefore of little value in program planning and evaluation. This is almost inevitable unless the register is integrated into the day-to-day operations of the control program. A register may degenerate for one or more of the following reasons:

1. The patient-service functions of the register are duplicated in a variety of special record and tickler files. The register is not used by the nurses and others as a basis for action. Information on action taken, contacts made, and findings in the field is posted to the various special records but is not forwarded to the register clerk. As a result, the register soon becomes both incomplete and out of date and cannot be used as a basis for action. This is unfortunate, unnecessary, and wasteful. A properly organized register is an efficient mechanism for scheduling action and makes available more complete information on each case than a number of unco-ordinated special files. In addition, the statistical data which can be abstracted from the register are generally more comprehensive and more uniform than those derived from a variety of specialized records.
2. The reporting system and the case register are poorly planned. Poor planning may involve one or more of the following: (a) report forms that do not provide the necessary information; (b) record forms that do not facilitate the posting of clear, concise, and complete abstract data; (c) files that do not facilitate ready reference to case records and are not efficient for use in scheduling action; (d) instructions that do not specify clear-cut procedures for handling the various report forms and for taking necessary action.
3. Insufficient personnel are provided for maintaining the register.
4. The reporting program is not promoted effectively, resulting in poor cooperation from the community physicians, hospitals, and other medical facilities.
5. Local health units are not given sound, continuous guidance by the State office in carrying out the control program and in maintaining the reporting and record keeping system.
6. The nature of the control program does not call for the establishment of a community case register and it is therefore not used.

If the aforementioned pitfalls are avoided, a community case register can be an effective tool in the administration of a cancer control program. Various elements of the service program, such as nursing and follow-up, can be built around its operation. It facilitates the collection of quantitative data about services given and provides a wide variety of morbidity statistics.

PUBLIC HEALTH SERVICE PUBLICATIONS

July–December 1949

The purpose of this list is to provide a complete and continuing record of Public Health Service publications for reference use by librarians, scientists, researchers and others interested in public health work, and not to offer the publications for indiscriminate free distribution.

Single sample copies of most of the publications listed are available from the Public Inquiries Branch, Division of Public Health Methods, Public Health Service, Washington 25, D. C.

For quantities of any of these publications, except the statistical reports of the National Office of Vital Statistics, order from the Government Printing Office, where they are available at the prices shown with a 25 percent reduction on orders of 100 or more copies of any single publication. The statistical reports of the National Office of Vital Statistics can be obtained only by writing to the National Office of Vital Statistics, Public Health Service, Washington 25, D. C.

PERIODICALS

*Public Health Reports (weekly), July–December, vol. 64, Nos. 26–52, pages 817–1677. 10 cents a copy. Subscription price $4 a year.

*Extracts from Public Health Reports (monthly), July–December, Tuberculosis Control Issues, Nos. 41–46. Average 30 pages each. 10 cents a copy. Subscription price $1 a year.

*The Journal of Venereal Disease Information (monthly), July–December, vol. 30, Nos. 7–12, pages 185–382. 10 cents a copy. Subscription price $1.25 a year.

*Journal of the National Cancer Institute (bimonthly), August–December, vol. 10, Nos. 1–3, pages 1–807. Nos. 1 and 2, 40 cents a copy; No. 3, $1.50 a copy. Subscription price $8 a year.

Public Health Engineering Abstracts (monthly), July–December, vol. 29, Nos. 6–12. 32 pages each. No sales stock.

*Industrial Hygiene Newsletter (monthly), July–December, vol. 9, Nos. 7–12. 16 pages each. 10 cents a copy. Subscription price $1 a year.

National Negro Health News (quarterly), July–September; October–December, 1949, vol. 17, Nos. 3 and 4. 24 and 28 pages. No sales stock.

REPRINTS FROM PUBLIC HEALTH REPORTS

2944. Filariasis control by DDT residual house spraying, Saint Croix, Virgin Islands. I. Operational Aspects. By Charles E. Kohler. II. Results. By H. W. Brown and R. W. Williams. July 8, 1949. 20 pages. 10 cents.

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*Subscriptions to this periodical can be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

2945. *Salmonella* types encountered in Maryland between 1944 and 1948. By A. A. Hajna. July 8, 1949. 2 pages. 5 cents.

2946. Water resources and the Nation's health. By M. Allen Pond. July 15, 1949 8 pages. 5 cents.

2947. Isolation of *Histoplasma capsulatum* from soil. By C. W. Emmons. July 15, 1949. 5 pages; 12 illustrations. 5 cents.

2948. A method of supplying cellulose tape to physicians for diagonsis of enterobiasis. By M. M. Brooke, A. W. Donaldson, and R. B. Mitchell. July 15, 1949. 12 pages. 5 cents.

2949. An investigation of low mortality in certain areas. By Theodore D. Woolsey. July 22, 1949. 5 pages. 5 cents.

2950 Transmission of *Salmonella enteritidis* by the rat fleas *Xenopsylla cheopis* and *Nosopsyllus fasciatus*. By C. R. Eskey, Frank M. Prince, and Frank B. Fuller. July 29, 1949. 9 pages. 5 cents.

2951. Preliminary field trials with laboratory-tested molluscacides. By M. O. Nolan and E. G. Berry. July 29, 1949. 8 pages. 5 cents.

2952. Hospital survey and construction program. A progress report. By Vane M. Hoge. August 12, 1949. 19 pages. 10 cents.

2953. An epidemiologic study of brucellosis in Minnesota. By Robert L. Magoffin, Paul Kabler, Wesley W. Spink, and Dean Fleming. August 19, 1949. 24 pages. 10 cents.

2954. Relation of human and bovine brucellosis in Minnesota. By D. S. Fleming and M. H. Roepke. August 19, 1949. 8 pages. 5 cents.

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2956. Iodine—A food essential. By W. H. Sebrell. August 26, 1949. 13 pages. 5 cents.

2957. Distribution and salaries of directors of vital statistics and statisticians in State health departments as of August 1948. By Daniel D. Swinney. September 9, 1949. 16 pages. 5 cents.

2958. Case registers. By Marjorie T. Bellows. September 9, 1949. 12 pages. 5 cents.

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211. Care of the dog used in medical research. July 1949. 14 pages. 5 cents.
212. Typhoid fever prophylaxis by active immunization. By H. C. Batson. August 1949. 34 pages. 10 cents.

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130. Studies of survival of unicellular species. I. Variations in life expectancy of a paramecium under laboratory conditions. By R. R. Spencer and M. B. Melroy. August 1949. 10 pages. No sales stock.
131. Studies of survival of unicellular species. II. Some principles involved in the survival of bacterial species. By M. B. Melroy and R. R. Spencer. August 1949. 18 pages; 1 plate. No sales stock.
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150. Recent developments in the transparent-chamber technique as adapted to the mouse. By Glenn H. Algire and Frances Y. Legallais. October 1949. 12 pages; 8 plates. No sales stock.

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362. Serologic activity of dipalmityl lecithin. Preliminary report. By Arthur A. Rosenberg. July 1949. 2 pages. 5 cents.
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367. A study of nonspecific urethritis in British soldiery. By R. R. Willcox, September 1949. 9 pages. 5 cents.
368. Penicillin in the abortive treatment of syphilis. By Frederick Plotke, Henry Eisenberg, Amelia H. Baker, and M. E. Laughlin. September 1949. 5 pages. 5 cents.
369. The baffling case of baby T. By E. Walter Shervington, Cornelia M. Phillips, and N. A. Nelson. September 1949. 4 pages. 5 cents.
370. Attitude of venereal disease patients toward clinics and rapid treatment centers. By Lida J. Usilton and John W. Morse. October 1949. 6 pages. 5 cents.
371. Case holding in out-patient therapy of syphilis. A study of case-holding experiences in the out-patient management of patients treated with penicillin on an ambulatory basis. By R. M. Sorenson and R. D. Shannon. October 1949. 5 pages. 5 cents.
372. Rapid treatment of syphilis. A second study of clinic attendance. By Charles R. Hayman. October 1949. 4 pages. 5 cents.
373. The use of a multiple-copy form as an efficient clerical basis for medical clinics operation. By Henry Eisenberg, Robert Grund, Carma Rohwedder, and Mary Elizabeth Laughlin. October 1949. 4 pages. 5 cents.
374. Characteristics of the cerebrospinal fluid in lymphogranuloma venereum. By Laurence Finberg, Richard E. Lord, and Mark T. Cenac. October 1949. 4 pages. 5 cents.
375. Treponemal immobilization test of normal and syphilitic serums. By Harold J. Magnuson and Frederick A. Thompson, Jr. November 1949. 12 pages. 5 cents.
376. Penicillin in the treatment of early syphilis: 639 patients treated with 2,400,000 units of sodium penicillin in 7½ days. By Herman N. Bundesen, Frederick Plotke, George X. Schwemlein, and Jack Rodriquez. November 1949. 4 pages. 5 cents.
377. The effect of temperature variants on quantitative turbidimetric determinations of spinal fluid protein, using trichloracetic acid. By Virginia L. Harding and Ad Harris. November 1949. 4 pages. 5 cents.
378. Factors affecting the results of interviewing for contacts. By J. Wallace Rion and Sidney Abraham. December 1949. 8 pages. 5 cents.
379. Observation of the Kolmer complement-fixation test and the VDRL spinal fluid test. By Frank M. Victor and Charles A. Hunter. December 1949. 4 pages. 5 cents.

380. Penicillin treatment of early syphilis—First four patients after six years. By J. F. Mahoney, R. C. Arnold, and Ad Harris. December 1949. 6 pages. 5 cents.

SUPPLEMENTS TO THE JOURNAL OF VENEREAL DISEASE INFORMATION

22. Manual of serologic tests for syphilis. 1949. 128 pages. $1.50.
23. The diagnosis of syphilis by the general practitioner. By Joseph Earle Moore. 1949 revision of supplement 5. 68 pages. 25 cents.

PUBLIC HEALTH BULLETINS

302. Emergency health and sanitation activities of the Public Health Service during World War II. By Joseph W. Mountin and Edward B. Kovar. 1949. 96 pages, illustrated. 25 cents.
303. The role of grants-in-aid in financing public health programs. By Joseph W. Mountin and Clifford H. Greve. 1949. 45 pages. 15 cents.
304. Planning for health services. A guide for States and communities. 1949. 69 pages. 20 cents.
305. Health service areas. Estimates of future physician requirements. By Joseph W. Mountin, Elliott H. Pennell, and Anne G. Berger. 1949. 89 pages. 45 cents.
306. Air pollution in Donora, Pa. Epidemiology of the unusual smog episode of October 1948. Preliminary report. By H. H. Schrenk, Harry Heimann, George D. Clayton, W. M. Gafafer, and Harry Wexler. 1949. 173 pages, illustrated. $1.25.

NATIONAL INSTITUTES OF HEALTH BULLETIN

191. Relation between the toxic action of chlorinated methanes and their chemical and physicochemical properties. By W. F. von Oettingen, C. C. Powell, N. E. Sharpless, W. C. Alford, and L. J. Pecora. 1949. 85 pages. 30 cents.

HEALTH INFORMATION SERIES

10. Snake bite. 1949. 6 pages. 5 cents; $1.25 per 100.
32. Allergy. 1949. 2 pages. 5 cents; $1.00 per 100.
35. Psoriasis. 1949. 1 page. 5 cents; 75 cents per 100.
39. Home sanitation. 1949. 6 pages. 5 cents; $1.50 per 100.
47. Trichinosis. 1949. 3 pages. 5 cents; $1.00 per 100
65. Poison ivy. 1949. 3 pages. 5 cents; $1.00 per 100.

CANCER SERIES

1. Cancer—What to know, what to do about it. 1949. 8 pages. 5 cents; $1.50 per 100.
2. Cancer of the breast. 1949. 20 pages. 10 cents; $4.50 per 100.
3. Cancer of the female reproductive organs. 1949. 20 pages. 10 cents; $4.50 per 100.
4. Cancer of the digestive tract. 1949. 24 pages. 10 cents; $5.50 per 100.
5. Cancer of the mouth and respiratory tract. 1949. 20 pages. 10 cents; $4.50 per 100.

UNNUMBERED PUBLICATIONS

The American family. A factual background. 1949. 457 pages. $1.25.

Studies on household sewage disposal systems. By S. R. Weibel, C. P. Straub, and J. R. Thoman. 1949. 260 pages. $1.25.

The dentist in the U. S. Public Health Service. 1949. 28 pages; illustrated 15 cents.

Sodium fluoride goes to school. By V. R. Sill. 1949. 3 pages. 5 cents.

Methods of removing fluorides from water. By F. J. Maier. October 1949. 8 pages. No sales stock.

An evaluation of the effectiveness as a caries control measure of the topical application of solutions of fluorides. By John W. Knutson. October 1949. 12 pages. No sales stock.

A symposium on current progress in the study of venereal diseases. 1949. 308 pages. 75 cents.

Index to Public Health Reports, vol. 63, part II, July-December 1948. 31 pages. 10 cents.

NATIONAL OFFICE OF VITAL STATISTICS PUBLICATIONS*

Current Mortality Analysis (monthly), vol. 6, No. 13, 1948; vol. 7, Nos. 4–8, 1949.

Monthly Marriage Report (marriage licenses issued in major cities), vol. 3, Nos. 5–10, 1949.

Monthly Vital Statistics Bulletin, vol. 12, Nos. 5–10, 1949.

Weekly Mortality Index, vol. 20, Nos. 26–51, 1949.

Health Officers' Weekly Statement, July 2–December 31, 1949.

Communicable Disease Summary, July 2–December 31, 1949.

Vital Statistics—Special Reports, Vol. 31, National Summaries

No. 4. Deaths and death rates for selected causes: United States, each division and State, 1947. pp. 39–54.

No. 5. Deaths from selected causes for 92 major cities in the United States, 1947. pp. 55–72.

No. 6. Maternal mortality by race and by urban and rural areas: United States, each division and State, 1947. pp. 73–78.

No. 7. Births by person in attendance, by race and by urban and rural areas: United States, each division and State, 1947. pp. 79–90.

No. 8. Births by race and by urban and rural areas: United States, each division and State, 1947. pp. 91–98.

No. 9. Stillbirth statistics: United States, each division and State, and 92 major cities, 1947. pp. 99–108.

No. 10. Maternal mortality by cause: United States, 1947. pp 109–116.

No. 11. Deaths and death rates for selected causes, by age, race, and sex: United States, 1947. pp. 117–146.

No. 12. Infant mortality by race and by urban and rural areas: United States, each division and State, 1947. pp. 147–156.

No. 13. Deaths by urban and rural areas and by race: United States, each division and State, 1947. pp. 157–164.

No. 14. Infant mortality from selected causes: by age, race, and sex; United States, 1947. pp. 165–198.

No. 15. Births by age of mother, race, and birth order: United States, 1947. pp. 199–218.

No. 16. Provisional marriage and divorce statistics: United States, 1948. pp. 219–230.

*Available only from the National Office of Vital Statistics, Public Health Service, Washington 25, D. C.

No. 17. Accident fatalities in the United States, 1947. pp. 231–254.
No. 18. Motor vehicle accident fatalities: United States, 1947. pp. 255–303.

Vital Statistics—Special Reports, Vol. 32, Cancer Mortality in the United States

No. 1. Trend of cancer mortality in the United States, 1900–1945. pp. 1–14.

Vital Statistics—Special Reports, Vol. 33, Selected Studies

No. 3. The vital statistics system in Alaska. pp. 49–62.

Vital Statistics—Special Reports, Vol. 35, Selected Studies

No. 1. Summary of natality statistics: United States, 1948. pp. 1–10.

Examination for Medical Officers

Examination for Medical Officers in the Regular Corps of the Public Health Service will be held October 9, 10, and 11, 1950, in various cities throughout the country. Completed applications must be in the Washington office by September 11, 1950.

Appointments are permanent and offer opportunities for career service in clinical medicine, research and public health.

Appointments will be made in the grades of assistant and senior assistant (equivalent to Army ranks of 1st lieutenant and captain, respectively). Entrance pay is $5,686 for assistant (with dependents) and $6,546 for senior assistant (with dependents), including the $1,200 annual additional pay received by Medical Officers and rental and subsistence allowance.

Applicants must have at least 7 years educational training and professional experience after high school, including graduation from a recognized school of medicine.

For application forms and additional information write to: Surgeon General, Public Health Service, Federal Security Agency, Washington 25, D. C. Attention: Division of Commissioned Officers.

Incidence of Disease

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

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UNITED STATES

Reports From States for Week Ended August 5, 1950

For the current week, new cases of acute poliomyelitis reported in the Nation numbered 1,186, an increase over the 970 cases reported last week. However, the rate of increase is roughly comparable to preceding weeks. The total for the current week is less than the total for the corresponding week in 1946, 1948, and 1949. These totals were 1,284, 1,237, and 2,446, respectively.

The cumulative total (6,171) for the current "disease" year was below the corresponding total (9,810) for last year, the highest on record. The "disease" year for acute poliomyelitis begins with the twelfth week of the calendar year.

Comparative Data for Cases of Specified Reportable Diseases: United States

[Numbers after diseases are International List numbers, 1948 revision]

Disease	Total for week ended		5-year median 1945–49	Seasonal low week	Cumulative total since seasonal low week		5-year median 1944–45 through 1948–49	Cumulative total for calendar year		5-year median 1945–49
	Aug. 5, 1950	Aug. 6, 1949			1949–50	1948–49		1950	1949	
Anthrax (062)	2	2	(1)	(1)	(1)	(1)	(1)	29	35	(1)
Diphtheria (055)	63	86	135	27th	239	366	526	3,367	4,134	6,823
Acute infectious encephalitis (082)	20	22	19	(1)	(1)	(1)	(1)	472	333	294
Influenza (480–483)	859	508	508	30th	859	508	508	247,118	76,375	139,506
Measles (085)	1,906	1,526	1,526	35th	303,490	637,767	580,926	284,360	585,374	545,980
Meningococcal meningitis (057.0)	43	57	57	37th	3,456	3,094	3,355	2,543	2,250	2,383
Pneumonia (490–493)	873	899	-------	(1)	(1)	(1)	(1)	59,342	54,139	-------
Acute poliomyelitis (080)	1,186	2,446	1,237	11th	6,171	9,810	4,983	7,305	10,725	5,450
Rocky Mountain spotted fever (104)	22	30	40	(1)	(1)	(1)	(1)	299	377	353
Scarlet fever (050)	257	241	451	32d	56,352	79,965	88,334	39,913	57,421	61,648
Smallpox (084)	-------	-------	1	35th	[2] 44	49	197	[2] 24	39	143
Tularemia (059)	16	31	24	(1)	(1)	(1)	(1)	612	758	619
Typhoid and paratyphoid fever [3] (040, 041)	109	138	138	11th	1,399	1,631	1,631	1,909	2,119	2,119
Whooping cough (056)	2,602	1,696	2,519	39th	103,338	45,139	86,815	81,802	35,106	60,231

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[1] Not computed.
[2] New Mexico: Addition—week ended July 1, 1 case.
[3] Including cases reported as salmonellosis.

The cumulative total for the calendar year was 7,305, compared with the total of 10,725 for the corresponding period last year.

For the current week, all geographic divisions except the New England and Pacific showed increases over the preceding week. These increases ranged from 9 (16 to 25) cases reported in the Mountain States to 59 (140 to 199) cases in the East North Central States. The New England division decreased by 11 cases (30 to 19) and the Pacific decreased by 3 (95 to 92).

For the current week, the States reporting the largest numbers of cases were: Texas (122), New York (95), Virginia (88), Illinois (77), California (76), Pennsylvania (49), Tennessee (45), and Ohio (44).

The total number of cases of influenza reported for the current week was 859, compared with 508 for the corresponding period last year. Of this total, 680 cases were reported by Texas (420) and Virginia (260), The next highest number was reported by Arizona (43).

The total number of cases of infectious encephalitis reported for the week was 20, compared with 22 reported for the same period last year. For the calendar year, a total of 472 cases was reported, the highest total in the past 5 years.

Whooping cough continued above the 5-year median with 2,602 cases reported for the current week. For the corresponding period last year 1,696 cases were reported. For the current week, the State reporting the highest total was Texas, with 252 cases.

No smallpox was reported in the United States. One case of anthrax was reported in Pennsylvania and one case in Texas. Two cases of typhus were reported in Tennessee, type unspecified but presumed endemic.

Deaths During Week Ended August 5, 1950

	Week ended August 5, 1950	*Corresponding week, 1949*
Data for 93 large cities of the United States:		
Total deaths	8, 359	8, 817
Median for 3 prior years	8, 817	----------
Total deaths, first 31 weeks of year	289, 729	289, 327
Deaths under 1 year of age	600	736
Median for 3 prior years	704	----------
Deaths under 1 year of age, first 31 weeks of year	19, 179	20, 100
Data from industrial insurance companies:		
Policies in force	69, 675, 236	70, 282, 580
Number of death claims	11, 246	12, 534
Death claims per 1,000 policies in force, annual rate	8. 4	9. 3
Death claims per 1,000 policies, first 31 weeks of year, annual rate	9. 6	9. 4

Reported Cases of Selected Communicable Diseases: United States, Week Ended August 5, 1950

[Numbers under diseases are International List numbers, 1948 revision]

Area	Diphtheria (055)	Encephalitis, infectious (082)	Influenza (480–483)	Measles (085)	Meningitis, meningococcal (057.0)	Pneumonia (490–493)	Poliomyelitis (080)
United States	**63**	**20**	**859**	**1,906**	**43**	**873**	**1,186**
New England	1	----------	----------	138	----------	40	19
Maine	----------	----------	----------	----------	----------	16	1
New Hampshire	----------	----------	----------	----------	----------	----------	----------
Vermont	----------	----------	----------	9	----------	----------	----------
Massachusetts	1	----------	----------	110	----------	----------	9
Rhode Island	----------	----------	----------	----------	----------	----------	2
Connecticut	----------	----------	----------	19	----------	24	7
Middle Atlantic	11	5	1	576	7	120	168
New York	5	5	[1] 1	216	6	79	95
New Jersey	1	----------	----------	217	----------	17	24
Pennsylvania	5	----------	----------	143	1	24	49
East North Central	10	4	9	598	5	74	199
Ohio	2	----------	4	107	1	7	44
Indiana	4	1	1	8	----------	4	14
Illinois	2	1	----------	145	3	42	77
Michigan	2	2	----------	72	----------	18	41
Wisconsin	----------	----------	4	266	1	3	23
West North Central	----------	1	4	63	5	83	125
Minnesota	----------	----------	1	12	2	8	13
Iowa	----------	----------	----------	6	1	----------	46
Missouri	----------	----------	2	27	1	5	15
North Dakota	----------	----------	----------	8	----------	65	1
South Dakota	----------	1	----------	1	----------	----------	2
Nebraska	----------	----------	----------	5	1	1	19
Kansas	----------	----------	1	4	----------	4	29
South Atlantic	23	1	306	105	6	247	244
Delaware	----------	----------	----------	----------	1	----------	1
Maryland	----------	----------	1	8	----------	14	11
District of Columbia	----------	----------	1	2	----------	11	15
Virginia	1	----------	260	31	1	16	88
West Virginia	4	----------	3	29	1	1	19
North Carolina	10	1	----------	9	2	----------	41
South Carolina	1	----------	7	2	----------	2	26
Georgia	3	----------	33	14	1	195	31
Florida	4	----------	1	10	----------	8	12
East South Central	7	1	6	52	3	79	117
Kentucky	----------	----------	----------	6	1	10	42
Tennessee	----------	----------	3	34	1	----------	45
Alabama	3	----------	1	8	1	34	12
Mississippi	4	1	2	4	----------	35	18
West South Central	5	3	444	119	13	171	197
Arkansas	----------	----------	15	6	2	9	11
Louisiana	1	----------	1	5	2	13	29
Oklahoma	----------	3	8	5	3	6	35
Texas	4	----------	420	103	6	143	122
Mountain	3	----------	80	92	----------	29	25
Montana	----------	----------	12	1	----------	----------	3
Idaho	----------	----------	15	22	----------	----------	2
Wyoming	----------	----------	----------	----------	----------	1	3
Colorado	----------	----------	10	28	----------	21	7
New Mexico	----------	----------	----------	3	----------	4	6
Arizona	----------	----------	43	5	----------	1	2
Utah	3	----------	----------	30	----------	2	2
Nevada	----------	----------	----------	3	----------	----------	----------
Pacific	3	5	9	163	4	30	92
Washington	----------	----------	----------	19	----------	----------	9
Oregon	1	----------	5	9	2	6	7
California	2	5	4	135	2	24	76
Alaska	----------	1	----------	----------	----------	----------	----------
Hawaii	----------	----------	----------	2	----------	----------	2

[1] New York City only.

Anthrax: Pennsylvania and Texas, 1 case each.

Reported Cases of Selected Communicable Diseases: United States, Week Ended August 5, 1950—*Continued*

[Numbers under diseases are International List numbers, 1948 revision]

Area	Rocky mountain spotted fever (104)	Scarlet fever (050)	Smallpox (084)	Tularemia (059)	Typhoid and paratyphoid fever (040, 041)[1]	Whooping cough (056)	Rabies in animals
United States	**22**	**257**	---	**16**	**109**	**2,602**	**114**
New England	---	**10**	---	---	**7**	**236**	---
Maine	---	---	---	---	5	35	---
New Hampshire	---	---	---	---	---	---	---
Vermont	---	---	---	---	---	23	---
Massachusetts	---	5	---	---	2	109	---
Rhode Island	---	1	---	---	---	12	---
Connecticut	---	4	---	---	---	37	---
Middle Atlantic	**4**	**43**	---	**1**	**11**	**384**	**37**
New York	3	[2] 23	---	---	5	160	37
New Jersey	---	5	---	1	---	113	---
Pennsylvania	1	15	---	---	6	111	---
East North Central	**1**	**85**	---	**2**	**24**	**662**	**17**
Ohio	---	41	---	---	4	166	3
Indiana	1	4	---	1	1	8	---
Illinois	---	11	---	1	5	98	3
Michigan	---	22	---	---	---	218	10
Wisconsin	---	7	---	---	14	172	1
West North Central	---	**17**	---	**3**	**5**	**150**	**12**
Minnesota	---	3	---	---	---	31	---
Iowa	---	2	---	---	1	19	12
Missouri	---	3	---	3	1	42	---
North Dakota	---	---	---	---	---	---	---
South Dakota	---	---	---	---	---	15	---
Nebraska	---	5	---	---	1	10	---
Kansas	---	4	---	---	2	33	---
South Atlantic	**12**	**26**	---	**3**	**14**	**333**	**5**
Delaware	---	---	---	---	---	5	---
Maryland	2	---	---	---	---	50	---
District of Columbia	---	2	---	---	---	5	---
Virginia	6	7	---	---	2	120	1
West Virginia	---	[3] 7	---	---	2	20	1
North Carolina	4	6	---	---	2	73	---
South Carolina	---	1	---	---	1	17	2
Georgia	---	2	---	2	5	26	1
Florida	---	1	---	1	2	8	---
East South Central	**2**	**19**	---	**1**	**20**	**146**	**25**
Kentucky	---	4	---	---	12	90	7
Tennessee	2	9	---	1	2	22	2
Alabama	---	6	---	---	---	28	10
Mississippi	---	---	---	---	6	6	6
West South Central	**1**	**21**	---	**6**	**17**	**328**	**13**
Arkansas	1	1	---	3	3	47	---
Louisiana	---	1	---	---	2	3	---
Oklahoma	---	7	---	3	1	26	1
Texas	---	12	---	---	11	252	12
Mountain	**2**	**10**	---	---	**4**	**168**	**3**
Montana	---	---	---	---	1	16	---
Idaho	1	1	---	---	---	23	---
Wyoming	---	---	---	---	---	17	---
Colorado	---	3	---	---	1	10	3
New Mexico	---	2	---	---	2	49	---
Arizona	---	1	---	---	---	29	---
Utah	1	2	---	---	---	24	---
Nevada	---	1	---	---	---	---	---
Pacific	---	**26**	---	---	**7**	**195**	**2**
Washington	---	9	---	---	---	60	---
Oregon	---	3	---	---	---	17	---
California	---	14	---	---	7	118	2
Alaska	---	---	---	---	---	1	---
Hawaii	---	---	---	---	---	1	---

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[1] Including cases reported as salmonellosis.
[2] Including cases reported as streptococcal sore throat.
[3] Two weeks report.

FOREIGN REPORTS

CANADA

Reported Cases of Certain Diseases—Week Ended July 8, 1950

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Brucellosis					2	1					3
Chickenpox			33	1	76	173	33	40	32	61	449
Diphtheria			1	1	2						4
Dysentery, bacillary						1	5				6
Encephalitis, infectious						1					1
German measles			19		3	175	1	21	27	59	305
Influenza			7				2				9
Measles			4		136	469	10	30	19	45	713
Meningitis, meningococcal			1			2		1			1
Mumps			22		39	141	10	40	50	41	343
Poliomyelitis										4	4
Scarlet fever	4		1	2	29	19	3	1	20	3	82
Tuberculosis (all forms)	11		6	8	81	17	9	11	24	18	185
Typhoid and paratyphoid fever	1				5	1			1	2	10
Venereal diseases:											
Gonorrhea	11		9	6	85	72	22	6	33	58	302
Syphilis	5		1	2	62	18	4	11	3	9	115
Whooping cough	2		14		68	65		4		29	182

NORWAY

Reported Cases of Certain Diseases—May 1950

Disease	Cases	Disease	Cases
Diphtheria	11	Pneumonia (all forms)	2,697
Encephalitis, infectious	2	Poliomyelitis	4
Erysipelas	322	Rheumatic fever	117
Gastroenteritis	2,991	Scabies	754
Hepatitis, infectious	66	Scarlet fever	174
Impetigo contagiosa	1,522	Tuberculosis (all forms)	359
Influenza	2,094	Venereal diseases:	
Malaria	1	Gonorrhea	226
Measles	402	Syphilis	52
Meningitis, meningococcal	18	Weil's disease	3
Mumps	256	Whooping cough	2,611
Paratyphoid fever	1		

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

The following tables are not complete or final for the list of countries included or for the figures given. Since many of the figures are from weekly reports, the accumulated totals are for approximate dates.

CHOLERA

(Cases)

Place	January—May 1950	June 1950	July 1950—week ended— 1	8	15	22	29
ASIA							
Burma	15	40	45	66	65		
Akyab	1	1					
Bassein	1	2					
Maubin	3						
Pegu		1					
Rangoon	1						
Toungoo			1				
India	[1] 58, 189	8, 997	1, 982	1, 529	191	225	283
Ahmedabad	7						
Allahabad	3						
Bombay	[2] 1	1			1	66	135
Calcutta	[1] 6, 509	1, 177	193	197	180	158	141
Cawnpore	1						
Cocanada	2						
Cuddalore	31						
Lucknow	3	7		1	1		
Madras	11						
Masulipatam	46				1		
Nagpur				1	1	1	
Negapatam	67						
New Delhi		12	15	20	7		7
Port Blair (Andam Islands)	[2] 2						
Tellicherry	27						
Trichonopoly							1
Tuticorin	25						
Indochina (French)	12	1					
Cambodia	5						
Viet Nam	7	1					
Giadinh	3						
Rachgia	1						
Pakistan	19, 120	1, 303	273	106	6	6	
Chittagong	125	33	14	1	6	6	
Dacca	182	4	1				

[1] Includes imported case. [2] Imported.

PLAGUE

(Cases)

AFRICA							
Belgian Congo	7	4		3	1	1	
Costermansville Province	4	2					
Stanleyville Province	3	2		3	1	1	
Madagascar	44	1			[1] 2		
Rhodesia, Northern	2						
Union of South Africa	9						
Orange Free State	7						
ASIA							
Burma	[2] 208	5	2		1	2	1
Bassein	1						
Bhamo	[3] 2	1					
Henzada	12						
Kyaiklat	34						
Moulmein	[3] 1	1					1
Myaungmya	5						
Myingyan	2						
Pegu	1						
Pyapon	1						
Rangoon	[2] 5	1				2	
Yenangyaung	58						

See footnotes at end of table.

PLAGUE—Continued

Place	January—May 1950	June 1950	July 1950—week ended—				
			1	8	15	22	29
ASIA—continued							
China:							
Chekiang Province	10	-------	-------	-------	-------	-------	-------
Wenchow	[4] 4	-------	-------	-------	-------	-------	-------
Fukien Province	[5,6] 121	-------	-------	10	-------	-------	-------
Amoy	-------	-------	-------	10	-------	-------	-------
Kwangsi Province	[4] 63	-------	-------	-------	-------	-------	-------
Kwangtung Province	15	-------	-------	-------	-------	-------	-------
India	36, 523	583	-------	-------	-------	-------	-------
Allahabad	[3] 18	[3] 1	-------	-------	-------	-------	-------
Bombay	[2] 5	-------	-------	-------	-------	-------	-------
Calcutta	[2] 3	-------	-------	-------	-------	-------	-------
Cawnpore	18	-------	-------	-------	-------	-------	-------
Lucknow	[2] 9	-------	-------	-------	-------	-------	-------
Indochina (French):							
Annam	58	12	-------	3	1	1	-------
Phanthiet	54	12	-------	3	1	1	-------
Cambodia	[5] 45	1	-------	-------	-------	-------	-------
Pnompenh	3	-------	-------	-------	-------	-------	-------
Cochinchina	7	-------	-------	-------	1	3	1
Saigon	-------	-------	-------	-------	-------	-------	1
Laos	2	-------	-------	-------	-------	-------	-------
Indonesia:							
Java	319	20	4	-------	9	4	-------
Bandoeng	2	1	-------	-------	-------	-------	-------
Djakarta	-------	-------	-------	-------	-------	[3] 1	-------
Jogjakarta	158	19	4	-------	9	3	-------
Pakistan	1	-------	-------	-------	-------	-------	-------
Karachi	[2] 1	-------	-------	-------	-------	-------	-------
Thailand (Siam)	56	-------	-------	-------	-------	-------	-------
SOUTH AMERICA							
Ecuador	14	-------	-------	-------	-------	-------	-------
Chimborazo Province	4	-------	-------	-------	-------	-------	-------
El Oro Province	4	-------	-------	-------	-------	-------	-------
Loja Province	6	-------	-------	-------	-------	-------	-------
Peru	14	-------	-------	-------	-------	-------	-------
Ancash Department	[7] 3	-------	-------	-------	-------	-------	-------
Lambayeque Department	1	-------	-------	-------	-------	-------	-------
Lima Department	3	-------	-------	-------	-------	-------	-------
Piura Department	[8] 7	-------	-------	-------	-------	-------	-------
Venezuela	5	-------	-------	-------	-------	-------	-------
Miranda State	5	-------	-------	-------	-------	-------	-------

[1] July 11-20, 1950.
[2] Includes imported cases.
[3] Imported.
[4] Deaths.
[5] Includes suspected cases.
[6] Includes 9 deaths reported as cases on Kinmen Island.
[7] Mar. 1-31, 1950.
[8] Corrected figure.

SMALLPOX

(Cases)

AFRICA							
Algeria	73	4	-------	-------	-------	-------	-------
Angola	119	-------	-------	-------	-------	-------	-------
Bechuanaland	7	-------	-------	-------	-------	-------	-------
Belgian Congo	1, 260	276	136	111	97	-------	-------
British East Africa:							
Kenya	10	-------	-------	-------	-------	-------	-------
Nyasaland	237	3	-------	-------	-------	-------	-------
Tanganyika	224	12	3	2	2	-------	-------
Uganda	2	-------	-------	-------	-------	-------	-------
Cameroon (British)	272	38	-------	-------	-------	-------	-------
Cameroon (French)	88	4	-------	-------	-------	-------	-------
Dahomey	198	9	-------	[1] 8	[2] 7	-------	-------
Egypt	[3] 4	-------	-------	-------	-------	-------	-------
Eritrea	1	-------	-------	-------	-------	-------	-------
Ethiopia	17	-------	-------	-------	-------	-------	-------
French Equatorial Africa	417	14	-------	-------	-------	-------	-------
French Guinea	11	1	-------	-------	-------	-------	-------
French West Africa: Haute Volta	172	23	-------	-------	[2] 4	-------	-------
Gambia	5	-------	-------	-------	-------	-------	-------
Gold Coast	94	-------	-------	[4] 65	-------	-------	-------

See footnotes at end of table.

Place	January—May 1950	June 1950	July 1950—week ended—				
			1	8	15	22	29
AFRICA—continued							
Ivory Coast	491	14		[1] 17	[2] 11		
Libya	2						
Mauritania	1						
Morocco (French)	5	2		[1] 1			
Mozambique	107	21					
Nigeria	11,761	604					
Niger Territory	895	110		[1] 19	[2] 42		
Rhodesia:							
Northern	4						
Southern	330	74					
Senegal	2						
Sierra Leone	28						
Sudan (Anglo-Egyptian)	52	19		1	1		
Sudan (French)	96	7					
Togo (French)	42	6					
Tunisia	1						
Union of South Africa	341	3		5			
ASIA							
Afghanistan	255	21					
Arabia	329	[5] 1					
Bahrein Islands: **Bahrein**	34						
Burma	4,908	47	5	6			
China	630						
India	87,153	13,241	2,645	[6] 1,447	[6] 681		
India (Portuguese)	24	26					
Indochina (French)	355	10	4	4	6		
Indonesia:							
Borneo	145	130	2	6	21		
Java	1,665	800	27	190	237	12	
Sumatra	132	25	2		4		
Iran	168	15	6				
Iraq	114	[3] 15			2	6	
Israel	15						
Japan	[7] 3						
Korea (Republic of)	1,331						
Lebanon	2						
Netherlands New Guinea	3						
Pakistan	11,148	1,879	283	69			
Palestine	88			1			
Syria	15						
Thailand (Siam)	460						
Transjordan	29	1		3		1	
Turkey (See Turkey in Europe.)							
United Nations Relief and Works Agency for Palestine Refugees	1	2	2				
EUROPE							
Great Britain:							
England: **Liverpool**	[5] 1						
Scotland: **Glasgow**	21						
Greece	1	14					
Athens		1					
Piraeus		1					
Xylokastron	1						
Turkey	8						
NORTH AMERICA							
Guatemala	2						
Mexico	412	27		1			
SOUTH AMERICA							
Argentina	517						
Brazil	30	4	1	5	1		
Chile	3,482	135	15	49			
Colombia	537	16			1		
Ecuador	88	7					
Paraguay	1						
Peru	855						
Venezuela	47	4					
OCEANIA							
Australia: **Fremantle**	[5] 1						

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[1] July 1–10, 1950. [2] July 11–20, 1950. [3] Includes imported cases. [4] May 25-July 8, 1950. [5] Imported. [6] Preliminary figures. [7] Corrected figure.

TYPHUS FEVER*

(Cases; P=present)

Place	January—May 1950	June 1950	July 1950—week ended—				
			1	8	15	22	29
AFRICA							
Algeria	83	5					
Basutoland	22						
Belgian Congo	[1] 43	[2] 24					
British East Africa: Kenya	11						
Egypt	64	13	2		1		
Eritrea	10	4		1			
Ethiopia	317						
French Equatorial Africa	5						
Gold Coast	6						
Libya	83	10			2		
Madagascar	[2] 1	1					
Morocco (French)	4	1					
Morocco (International Zone)	1						
Morocco (Spanish Zone)	3						
Mozambique	1	2					
Nigeria	1						
Rhodesia, Southern	5						
Sierra Leone	[2] 3						
Sudan (Anglo-Egyptian)	4						
Tunisia	40						
Union of South Africa	[1] 31	P					
ASIA							
Afghanistan	1,177	105					
Burma	[2] 8						
China	[2] 8						
India	237		2	1			
India (Portuguese)	9	2	3				
Indochina (French)	30		1				
Indonesia:							
Java	6						
Sumatra	1						
Iran	133	12	3				
Iraq	90	21	2	3	4	2	
Japan	829	34	1			1	
Korea (Republic of)	[2] 1,161						
Lebanon	1						
Netherlands New Guinea					1		
Pakistan	68	20	1	1	1	1	
Palestine	2						
Straits Settlements: Singapore	[1] 4	[2] 1					
Syria	[1] 35	2					
Transjordan	14	1					
Turkey (see Turkey in Europe).							
United Nations Relief and Works Agency for Palestine Refugees	1		1				
EUROPE							
France	1						
Germany (British Zone)	2						
Germany (French Zone)	2						
Germany (United States Zone)	1						
Great Britain:							
England: Liverpool	[2, 3] 1						
Island of Malta	[2] 4	[2] 1	[2] 2				
Greece	[1] 22	1					
Hungary	3	1					
Italy	81						
Sicily	73						
Poland	37						
Spain	13	12					
Turkey	132	18	12	2	1	3	2
Yugoslavia	209	27					
NORTH AMERICA							
Costa Rica [2]	3	1					
Guatemala	9						
Jamaica [2]	11	5	1	1	3		
Mexico [1]	261	10		5	1	2	
Panama Canal Zone	[2] 1						
Puerto Rico [2]	9						
SOUTH AMERICA							
Argentina	[1] 2						
Chile	[1] 64	12	1	7		2	
Colombia	[1] 300	17			3		
Curacao	[2] 1						
Ecuador	98	1					
Peru	397						
Venezuela	[2] 6						

See footnotes at end of table.

TYPHUS FEVER—Continued

Place	January—May 1950	June 1950	July 1950—week ended— 1	8	15	22	29
OCEANIA							
Australia [2]	68	12	2	1			
Hawaii Territory	[4] 3	4	1				

*Reports from some areas are probably murine type, while others include both murine and louse-borne types.

[1] Includes murine type. [2] Murine type. [3] Imported. [4] Includes 2 cases murine type, and 1 case off-shipping, type unspecified.

YELLOW FEVER

(C—cases; D—deaths)

AFRICA								
French Equatorial Africa	C	1						
Port Gentil	C	[1] 1						
Gold Coast	C	10						
Ankobra Ferry	D	1						
Kade	C	1						
Oda Area:								
Akwatia	C	[2] 7						
Atiankama	C	1						
Sierra Leone	C	1	2					
Koinadugu District	C	1	[1] 2					
NORTH AMERICA								
Panama:								
Colon	D	1						
SOUTH AMERICA								
Bolivia:								
Chuquisaca Department	C	[3] 350						
La Paz Department	C	[4] 17						
Brazil:								
Maranhao State	D	1						
Colinas	D	[5] 1						
Colombia:								
Magdalena Department	D	1						
Los Angeles, Rio de Oro	D	[6] 1						
Putumayo Commissary	D	3						
Mocoa Locality	D	[7] 3						
Peru:								
Cuzco Department	D	2						
Quincemil	D	2						
Huanuco Department	C	1						
Tingo Maria	C	1						
Junin Department	D		1					
San Ramon	D		1					
San Martin Department	D	2						
Juanjui	D	1						
Lamas	D	1						

[1] Suspected. [2] Includes 4 suspected cases. [3] Reported in Azero Province during the period Jan. 1–Mar. 14, 1950, with 230 deaths. [4] Outbreak in North and South Yungas Provinces. Eight deaths reported. [5] April 3, 1950. [6] Jan. 1–31, 1950. [7] Includes 2 deaths, Apr. 5–7, 1950.

Bubonic Plague in Fort Defiance, Arizona

A positive bubonic plague specimen was identified by the New Mexico State Public Health Laboratory. According to a telegram dated August 15, the specimen was obtained from a patient in the Navajo Medical Center, Fort Defiance, Arizona. Confirmation of the laboratory report and the case report have not yet been received.

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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TUBERCULOSIS CONTROL ISSUE NO. 55

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Public Health Reports

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Studies of Pulmonary Findings and Antigen Sensitivity Among Student Nurses

VI. Geographic Differences in Sensitivity to Tuberculin as Evidence of Nonspecific Allergy

By CARROLL E. PALMER, M. D., SHIRLEY H. FEREBEE, B. A., and O. STRANGE PETERSEN, M. A.*

Evidence accumulated in recent years seems to indicate that the maximum critical dose of tuberculin for identifying persons who are or have been infected with tuberculosis lies in the neighborhood of .0001 mg. of standardized PPD or its equivalent. A few exceptions to this can be considered well established. For example, tuberculin sensitivity apparently wanes in old age, in the terminal stages of tuberculosis, and with some other active infections. Apart from such deviations, however, infected persons usually respond to a low dose of tuberculin.

As a corollary, considerable uncertainty has developed as to the interpretation of reactions elicited only with the higher doses of tuberculin, and during the last few years there has been a growing doubt as to the specificity of at least some of such responses. Actually, the literature on tuberculin testing contains a tremendous volume of material on the wide usage and general acceptance of the higher doses. In contrast, it contains little evidence to justify the use of such doses in testing human beings. Furthermore, much inconsistency in the application of tuberculin test results may be traced to the failure to distinguish and interpret properly high and low dose reactions. With the growing interest in BCG vaccination programs, and the dependence of such programs on the tuberculin test, the

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This is the fifty-fifth of a series of special issues of PUBLIC HEALTH REPORTS devoted exclusively to tuberculosis control, which appears in the first week of each month. The series began with the Mar. 1, 1946, issue. The articles in these special issues are reprinted as extracts from the PUBLIC HEALTH REPORTS. Effective with the July 5, 1946, issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 10 cents a single copy. Subscriptions are obtainable at $1.00 per year; $1.25 foreign.

development of reliable criteria for separating specific from nonspecific responses to tuberculin has become a crucial problem in tuberculosis work.

Previous reports in this series have examined several aspects of this problem, and, though most of the evidence is indirect, the findings definitely support the view that different meanings must be attached to low in contrast to high dose tuberculin reactions. The present study represents further investigation of this question by a detailed analysis of geographic differences in tuberculin reactions among student nurses.

Material

The observations are derived from the comprehensive program for the study of tuberculosis in student nurses, initiated in 1943 by the National Tuberculosis Association, the Public Health Service, and a number of schools of nursing in 10 widely separated metropolitan areas in the United States. A full description of the basic material, techniques, and classifications, will be found in the earlier reports (*1–5*). The immediately preceding report in the series (*5*) contains a fairly detailed consideration of theoretical aspects of interpreting distributions of tuberculin sensitivity.

The nurses were tuberculin tested at regular 6-month intervals by one team of carefully trained personnel of the Public Health Service who took all possible measures to secure and maintain uniform techniques. The group under study constitutes a homogeneous population: young, white girls of approximately the same age, all taking nurses' training. Differences in tuberculin sensitivity which might appear in such a population from different parts of the United States would thus be expected to indicate geographic variations. In reports IV and V, (*4, 5*) in which the nurses were subdivided according to place of training, differences between metropolitan areas were interpreted as geographic. Since, however, a more precise method would be to compare tuberculin sensitivity of longtime residents in different areas, the present analysis is based on a subdivision by residence rather than place of training.

The tuberculin used (PPD–S) was prepared at the Henry Phipps Institute in Philadelphia. All nurses were given a first dose of 0.0001 mg. Those who failed to give a reaction of at least 10 mm. of firm induration were administered a second dose of .005 mg. Reactions were read at 48 hours and the widest transverse diameters of induration and erythema were measured and recorded in millimeters. In addition, all indurations of 5 mm. or more were graded into four qualitative categories: I represented typical, well-circumscribed firm reactions; IV soft, questionable indurations; and II and III, intermediate types.

In this report, the classification of reactors into four groups differs in some respects from that used in earlier reports. Those who reacted to the first dose with at least 5 mm. of induration, description I, II, or III, are classified as "1st dose reactors." Those who did not, but who reacted to the 2d dose with at least 5 mm. of induration, any description, are classified as 2d dose reactors: these are specified as "strong 2d dose reactors" when the induration was 10 mm. or more, description I or II; otherwise they are specified as "slight 2d dose reactors." The fourth class, "nonreactors," are those who showed only erythema or less than 5 mm. of induration to the 2d dose. The two groups designated here as 1st dose reactors and strong 2d dose reactors were defined precisely as "definite" and "questionable" reactors, respectively, in the previous studies.

Subdivision of the entire range of tuberculin sensitivity into four simple classes was considered sufficient for the broad epidemiological purposes of the present study, since it appears appropriate to assume that 1st dose reactors and nonreactors correspond with "positive" and "negative" tuberculin reactors. This assumption is in accordance with the traditional view that "positive" reactors are persons who have been infected with the tubercle bacillus, and "negative" reactors are persons who have not been infected. Lying between the two extremes in the scale of tuberculin sensitivity, 2d dose reactions constitute a critical group because of the uncertainty as to their relation to tuberculous infection and disease. Further, in accordance with evidence presented in earlier reports the very substantial cutaneous responses classified as strong 2d dose reactions merit separate consideration.

The present analysis is limited to the records of the nurses with a "lifetime" residence in one place, the requirement being that they had spent at least five-sixths of their lives in the same place. They were allocated by States, and within each State according to three types of community (1930 census), viz: cities of more than 10,000 inhabitants, cities of 10,000 inhabitants or less, and "farms." Great precautions were taken to include in the last group only nurses who had lived on farms practically all of their lives. The study is also limited to nurses who were tested within 12 months after admission to training. Most of these, however, were tested within the first 2 months and a very high proportion within 6 months of the time they entered training. Tests made this early in training will not be affected very much either by the nurses' exposure to tuberculosis in the hospital or in the wider environment of the city in which the hospital of training is located. These criteria have reduced the group about 16,000 nurses, included in the previous two reports, to a total of 10,058. Classified according to State of lifetime residence (appendix table), nurses from all the States and the District of Columbia are represented. The geographic distribution is very uneven—80 percent of all the nurses originated from 8 States which contributed at least several hundred nurses each, while another 8 States each contributed between 100 and 200 observations. From a total of 29 States more than 30 observations were available.[1]

Results

Differences Among States

The 29 States having at least 30 observations have been arranged according to the percentages of each of thee definitions of reactors (table 1). Variation in the percentage of the 1st dose reactors is apparent—from 4.6 to 27.8 percent. Six States show rates between 5 and 10 percent, 10 between 10 and 15, and 9 between 15 and 20 percent, and, in a general way, the distribution of percentages follow a monomodal frequency curve, without obvious breaks.

Table 1. *Arrays of 29 States by frequencies of 1st dose reactors, strong 2d dose reactors, and all 2d dose reactors among lifetime residents*

(1) 1st dose reactors		(2) Strong 2d dose reactors		(3) All 2d dose reactors	
State	Percentage	State	Percentage	State	Percentage
Alabama	4.6	Indiana	0.0	Indiana	5.6
North Dakota	5.9	Iowa	.8	New Jersey	17.6
Minnesota	7.1	Wisconsin	1.4	Iowa	17.8
Wyoming	8.6	New Jersey	1.4	Wisconsin	18.8
Nebraska	9.0	North Dakota	2.0	New York	19.1
Wisconsin	9.0	Minnesota	2.4	Wyoming	20.0
Mississippi	9.3	New York	2.5	South Dakota	20.7
Ohio	10.0	Ohio	2.6	Michigan	21.5
Kansas-Missouri	10.2	Wyoming	2.9	North Dakota	21.8
Michigan	10.7	South Dakota	3.4	Ohio	24.9
Iowa	11.0	Pennsylvania	3.4	Pennsylvania	25.0
West Virginia	11.3	California	3.6	California	25.0
Virginia	12.1	West Virginia	3.8	Minnesota	25.2
Colorado	12.5	D. C.	3.8	Colorado	28.0
Louisiana	12.6	Michigan	4.8	Illinois	29.7
South Dakota	12.6	Maryland	5.4	Nebraska	30.3
North Carolina	13.3	Colorado	5.4	Virginia	31.8
Maryland	15.4	Illinois	5.4	D. C.	32.7
California	15.7	Kansas-Missouri	6.0	Maryland	33.0
New Jersey	16.2	Virginia	6.1	West Virginia	34.0
Illinois	16.2	Nebraska	7.9	Kansas-Missouri	35.9
D. C.	17.3	Texas	9.7	North Carolina	51.1
Florida	17.5	North Carolina	11.1	Texas	51.4
Pennsylvania	17.7	Florida	11.7	Florida	51.4
New York	17.8	Oklahoma	11.8	Oklahoma	52.9
Arkansas	19.4	Mississippi	13.1	Arkansas	54.8
Oklahoma	20.6	Alabama	14.0	Louisiana	58.2
Texas	25.0	Louisiana	15.5	Alabama	65.1
Indiana	27.8	Arkansas	16.1	Mississippi	66.4

Study of the location of the 29 States according to increasing percentage of 1st dose reactors fails to reveal any very systematic grouping of large geographically contiguous areas. Low rates tend to predominate for States in the north and west and high rates tend to be found in the industrial centers of the east and some of the southern States, but there is considerable irregularity in the location of high and low prevalence areas of 1st dose reactors. In some respects, however, the frequency of 1st dose reactors appears to conform with other indices of the prevalence of tuberculosis. Actually, although the details are not given here, there is a substantial though not very high correlation between tuberculosis mortality rates for the white population in the 29 States and the percentage of 1st dose reactors.

---

[1] The District of Columbia is counted as a State, and Kansas and Missouri as one State, since for technical reasons they were combined when the material was tabulated.

Striking differences between reactors to the 1st and 2d doses of tuberculin may be observed by referring again to table 1 where the 29 States are listed according to increasing percentages of strong 2d dose (column 2) and all 2d dose reactors (column 3). First, there is obviously a close association in the frequency of the two classes of 2d dose reactors and almost none apparent between either of them and 1st dose reactors. Actually, the correlation coefficient between strong and slight 2d dose reactors equals 0.9; that between 1st dose and strong 2d dose, 0.04; that between 1st dose and slight 2d dose, −0.06.

Second, a very significant epidemiological observation may be noted from the arrangement of the 29 States in increasing order of frequency of either strong or all 2d dose reactors. All 8 southern States in the group furnish the highest percentages and there is an obvious break or discontinuity in the distributions. The frequencies of all 2d dose reactors vary from 5 to 65 percent, but no States have percentages between approximately 35 and 50. The 8 southern States all show rates above 50, and the other States rates below 35 percent. For strong 2d dose reactors there are only 2 States, Texas and Nebraska, which fall within a range of from about 6 to 11 percent. Excluding the exceptions mentioned, the southern States have rates from 11 to 16 and the other States rates below about 6 percent.

In addition to the sharp contrast between the 8 southern and the 21 other States, detailed study of columns 2 and 3 of table 1 shows that the highest rates outside of the South, i. e., percentages of around 4 to 6 for strong 2d dose and from 25 to 35 percent for all 2d dose reactors, tend to include two groups of States, one in about the center of the country, and another along the middle of the Atlantic seaboard. There may be some question of the appropriateness of attempting to select a geographically distinct group which showed intermediate rates of 2d dose reactions, but it has seemed worth while to do so even though the selection must be arbitrary.

Table 2 shows the results of separating the 29 States into three major groups, each representing fairly distinct geographic areas. This division fails to show any difference in the distribution of percentages for 1st dose reactors, while the percentages of both strong and slight 2d dose reactors in the "South" and in the "other States" are distinctly separated, with the other areas in an intermediate

Table 2. *Distribution of 8 Southern,*[1] *7 Central and mid-Atlantic,*[2] *and 14 other*[3] *States according to the frequencies of 1st dose reactors, strong 2d dose reactors, and all 2d dose reactors among lifetime residents*

1st dose reactors					Strong 2d dose reactors					All 2d dose reactors				
Percentage	All States	Southern	Central and mid-Atlantic	Others	Percentage	All States	Southern	Central and mid-Atlantic	Others	Percentage	All States	Southern	Central and mid-Atlantic	Others
Total	29	8	7	14		29	8	7	14		29	8	7	14
0.0–4.9	1	1			0.0–1.9	4			4	0.0–9.9	1			1
5.0–9.9	6	1	1	4	2.0–3.9	10		2	8	10.0–19.9	4			4
10.0–14.9	10	2	4	4	4.0–5.9	4		2	2	20.0–29.9	10		1	9
15.0–19.9	9	2	2	5	6.0–7.9	3		3		30.0–39.9	6		6	
20.0–24.9	1	1			8.0–9.9	1	1			40.0–49.9				
25.0–29.9	2	1		1	10.0–11.9	3	3			50.0–59.9	6	6		
					12.0–13.9	1	1			60.0–69.9	2	2		
					14.0–15.9	2	2							
					16.0–17.9	1	1							

[1] Includes: Alabama, Arkansas, Florida, Louisiana, Mississippi, North Carolina, Oklahoma, Texas.

[2] Includes: Colorado, District of Columbia, Kansas-Missouri, Maryland, Nebraska, Virginia, West Virginia.

[3] Includes: California, Illinois, Indiana, Iowa, Michigan, Minnesota, New Jersey, New York, North Dakota, Ohio, Pennsylvania, South Dakota, Wisconsin, Wyoming.

position. In spite of the fact that many of the percentages were computed from quite small numbers, and must be subject to substantial random errors, a fairly well circumscribed area supplies all the high frequencies of 2d dose reactors. Thus it appears that the States covering, roughly, the southeastern quarter of the country constitute an area in which tuberculin sensitivity is distinctly different from that found elsewhere.

Differences Among Zones

In the preliminary survey of the data, States contributing only very small numbers of observations were omitted, but for a further examination it was considered expedient to use a geographic division in which all of the States were grouped into the 10 zones as shown in figure 1. This grouping, which is largely arbitrary, was determined mainly by three considerations: a natural division into areas of a fairly regular shape, a reasonably large number of observations of roughly the same order of magnitude in each area, and contrast between areas with respect to 2d dose sensitivity. These principles were followed as far as possible, but it became desirable to include two numerically small zones both with between 100 and 200 observations. Each of the 10 zones is believed to be fairly homogeneous with respect to high-dose tuberculin sensitivity, although individual States within the same zone differ somewhat. A systematic analysis of these differences is not promising, however, because of the very small number contributed by many States. In fact, each of the 10 zones is dominated by one State.

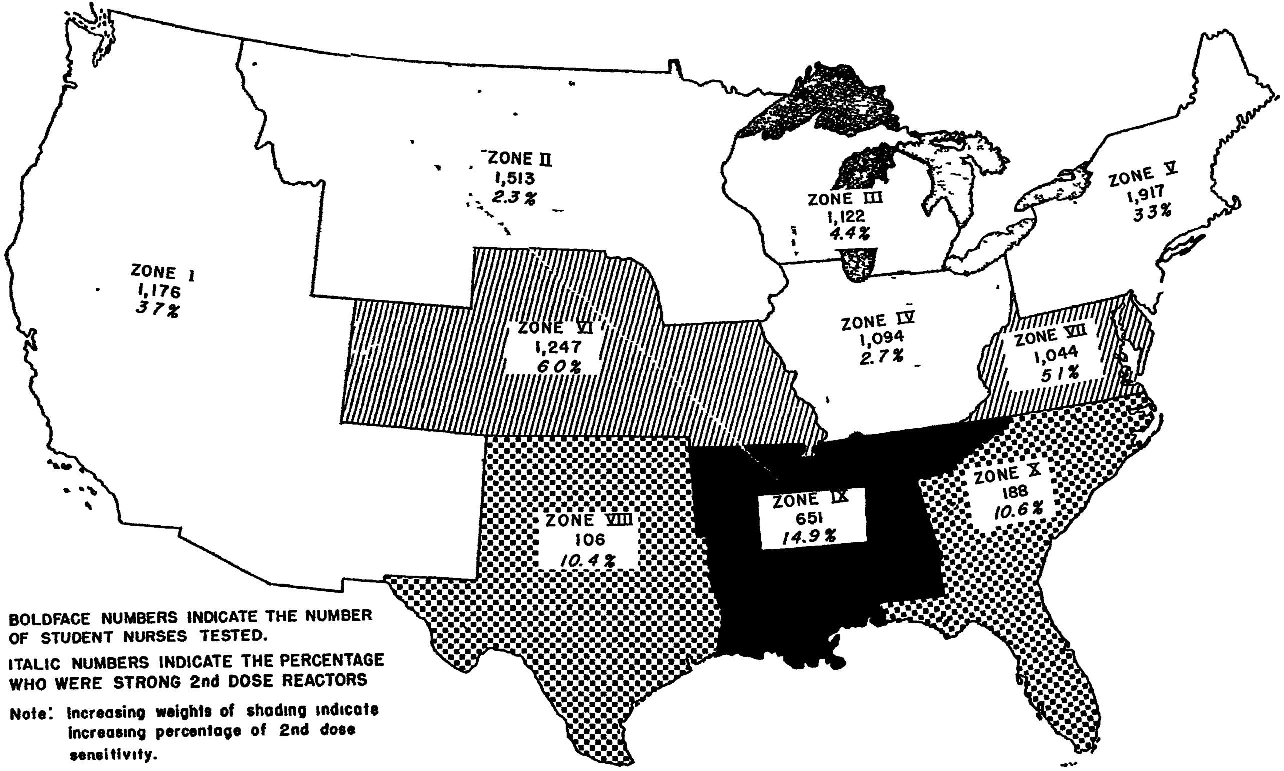

Figure 1. Division of the United States into 10 zones, showing the numbers of lifetime residents tested and the percentage classified as strong 2d dose reactors in each zone.

ZONE I
1,176
37%
ZONE II
1,513
2.3%
ZONE III
1,122
4.4%
ZONE IV
1,094
2.7%
ZONE V
1,917
33%
ZONE VI
1,247
60%
ZONE VII
1,044
51%
ZONE VIII
106
10.4%
ZONE IX
651
14.9%
ZONE X
188
10.6%
BOLDFACE NUMBERS INDICATE THE NUMBER OF STUDENT NURSES TESTED.
ITALIC NUMBERS INDICATE THE PERCENTAGE WHO WERE STRONG 2nd DOSE REACTORS
Note: Increasing weights of shading indicate increasing percentage of 2nd dose sensitivity.

Table 3. *Percentage of 1st dose reactors, strong 2d dose reactors, and all 2d dose reactors among student nurses classified by place of lifetime residence*

Zones and States	Total			All cities			Cities over 10,000			Cities under 10,000			Farm		
	1st dose reactors	Strong 2d dose reactors	All 2d dose reactors	1st dose reactors	Strong 2d dose reactors	All 2d dose reactors	1st dose reactors	Strong 2d dose reactors	All 2d dose reactors	1st dose reactors	Strong 2d dose reactors	All 2d dose reactors	1st dose reactors	Strong 2d dose reactors	All 2d dose reactors
I (Calif., etc.)	16.4	3.7	24.8	16.5	3.9	24.0	16.1	4.0	23.8	18.5	3.6	24.6	15.3	1.6	31.5
II (Minn., etc.)	7.7	2.3	24.0	8.6	2.1	22.3	10.4	2.7	22.7	6.9	1.5	21.9	5.7	2.9	27.6
III (Mich., etc.)	10.5	4.4	21.2	11.3	4.5	20.6	11.4	4.8	21.0	10.8	3.6	19.4	4.7	3.1	24.8
IV (Ohio, etc.)	11.5	2.7	24.9	12.7	2.3	23.9	13.7	2.8	24.2	11.1	1.5	23.4	6.5	4.2	29.0
V (Pa., etc.)	17.8	3.3	24.2	18.2	3.3	24.0	18.7	3.4	25.2	17.0	3.2	21.4	11.1	3.7	26.9
VI (Kans.-Mo., etc.)	10.4	6.0	34.4	11.9	5.5	31.4	13.9	4.0	29.1	9.5	7.3	34.1	7.1	7.1	41.1
VII (Md., etc.)	14.9	5.1	32.8	15.4	5.0	32.5	16.8	5.1	33.4	11.4	4.5	29.8	11.7	5.8	35.0
VIII (Tex., etc.)	23.6	10.4	51.9	24.7	10.6	50.6	27.4	9.7	45.2	(17.4)	(13.0)	(65.2)	(19.0)	(9.5)	(57.1)
IX (La., etc.)	11.7	14.9	59.0	12.6	12.6	55.2	14.4	9.7	52.1	11.0	15.3	58.0	8.8	21.9	70.6
X (Fla., etc.)	13.8	10.6	51.6	14.2	9.5	46.6	15.4	5.1	46.2	12.9	14.3	47.1	12.5	15.0	70.0
Summary of major areas															
I-V ("other")	13.1	3.2	23.8	14.2	3.2	23.1	15.0	3.6	23.6	12.5	2.5	22.0	7.4	3.1	27.9
VI-VII ("central and mid-Atlantic")	12.5	5.6	33.7	13.7	5.2	31.9	15.6	4.7	31.7	10.2	6.2	32.4	8.2	6.8	39.6
VIII-X ("southern")	13.4	13.5	56.7	14.4	11.7	52.9	16.8	8.8	49.7	11.8	14.9	56.3	10.4	19.5	69.2

NOTE: Figures in parentheses are computed from less than 30 observations.

Table 3 shows for each of the 10 zones the percentage distributions of reactors calculated from the figures in the appendix. Zones I–V, covering the West and a broad belt in the north stretching from coast to coast, constitute a very large portion of the country the population of which is characterized by low frequencies of strong 2d dose reactors varying around the average of 3.2 percent. At the same time, this region includes zones with relatively low and high prevalence of 1st dose reactors, varying from 7.7 in zone II (Minnesota, etc.) to 17.8 in zone V (Pennsylvania, etc.).

In zones VI and VII (central States and mid-Atlantic States) there are relatively more strong 2d dose reactors (6.0 and 5.1 percent), but the frequencies of 1st dose reactors are neither very high nor very low. In the remaining major area, the South, the prevalence of 1st dose reactors appears high in zone VIII (Texas and Oklahoma), but not in zones IX and X, and the average for all southern States is not very different from that found for all nurses included in the study. At the same time, 13.5 percent of all nurses with a lifetime residence in the South reacted strongly to the 2d dose as against 3.2 percent of those from zones I–V, and the percentages for zones VIII (Texas and Oklahoma) and zone X (Florida, etc.) were about 10, as against nearly 15 in zone IX (Louisiana, etc.).

When all reactors to the 2d dose are considered, the differences among the three major areas become still more evident. The third column in table 3 shows distinctly three different levels of frequencies of all 2d dose reactors. In the first five zones, the percentages of all come close to an average of 24; in the South they are more than twice as high, 52, 59, and 52, respectively, in zones VIII to X, while they are 34 and 33 in the central and mid-Atlantic States (VI and VII).

The frequencies of 2d dose reactors in separate States or zones evidently vary much more than is compatible with the notion of a constant probability when the whole country is considered. Within the five first zones, however, the variation is not significantly larger than would be attributable to random fluctuations as measured by χ^2 tests for homogeneity.

Although the important feature is the striking difference between the two major areas in the occurrence of 2d dose reactors, the present material is not sufficient to establish geographic differences within the very large area covered by zones I–V. However, the occurrence of 2d dose reactors varied in fair agreement with the hypothesis of a constant probability of 3.2 percent for strong and 23.8 for all 2d dose reactors.

The percentage of strong 2d dose reactors can be compared to that found in the previous report for separate cities in which the nurses were located as shown in table 4. It appears that the allocation used in this study tends to widen the difference between North and South, suggesting that the geographic difference in the occurrence of 2d dose reactors is associated with previous long-time residency rather than with the place of training.

Table 4. *Number of student nurses tested and percentage classified as strong 2d dose reactors, by place of lifetime residence, and by city of training*

State of lifetime residence	Nurses tested	Strong 2d dose reactors percentage	City of training	Nurses tested	Strong 2d dose reactors percentage
Minnesota	1, 143	2. 4	Minneapolis	2, 419	3. 1
Ohio	959	2. 6	Columbus	1, 330	3. 3
Pennsylvania	1, 624	3. 4	Philadelphia	2, 179	4. 5
California	1, 080	3. 6	Los Angeles	1, 778	5. 0
			San Francisco	1, 111	4. 0
Michigan	978	4. 8	Detroit	1, 250	4. 2
Total	5, 784	3. 4	Total	10, 067	4. 0
Maryland	803	5. 4	Baltimore	1, 971	5. 7
Colorado	168	5. 4	Denver	1, 329	5. 1
Kansas and Missouri	990	6. 0	Kansas City, Kans	532	7. 7
			Kansas City, Mo	1, 131	5. 4
Louisiana	452	15. 5	New Orleans	1, 290	14. 3

Urban and Rural Differences

Another striking feature is demonstrated by comparisons between students with urban and rural residence prior to entering nursing school. As shown in table 3, in all 10 zones the proportions of 1st dose reactors is always higher in the cities than in the country, and with one exception highest in the largest cities. The frequencies of 2d dose reactors, on the other hand, tend to vary in the opposite direction. In the south there are many more strong 2d dose reactors in the country than in the cities, and in the central and mid-Atlantic regions there is a small difference in the same direction, but in the other States, strong 2d dose reactors are found among both urban and rural residents with nearly the same frequency. If all 2d dose reactors are considered, the percentages are always higher in the country than in the cities in all parts of the United States, but especially in the South.

All Levels of Tuberculin Sensitivity

To compare the whole range of tuberculin sensitivity in different places, figure 2 was drawn to show the distributions according to four degrees of sensitivity, with separate histograms for residents of larger cities, small cities, and farms for each of the 10 zones. In the left-hand section of the graph representing zones I–V, the general visual impression suggests the existence of a definite configuration, or form of histogram. The configuration can be described roughly as U-shaped, with the two limbs of the U representing 1st dose reactors and nonreactors, respectively, and the middle part representing strong and slight 2d dose reactors. The histograms illustrating the range of tuberculin sensitivity of nurses in zones I–V vary considerably with respect to the relative height of the two "limbs" of the U, that is, with respect to the relative proportions of low dose reactors and of

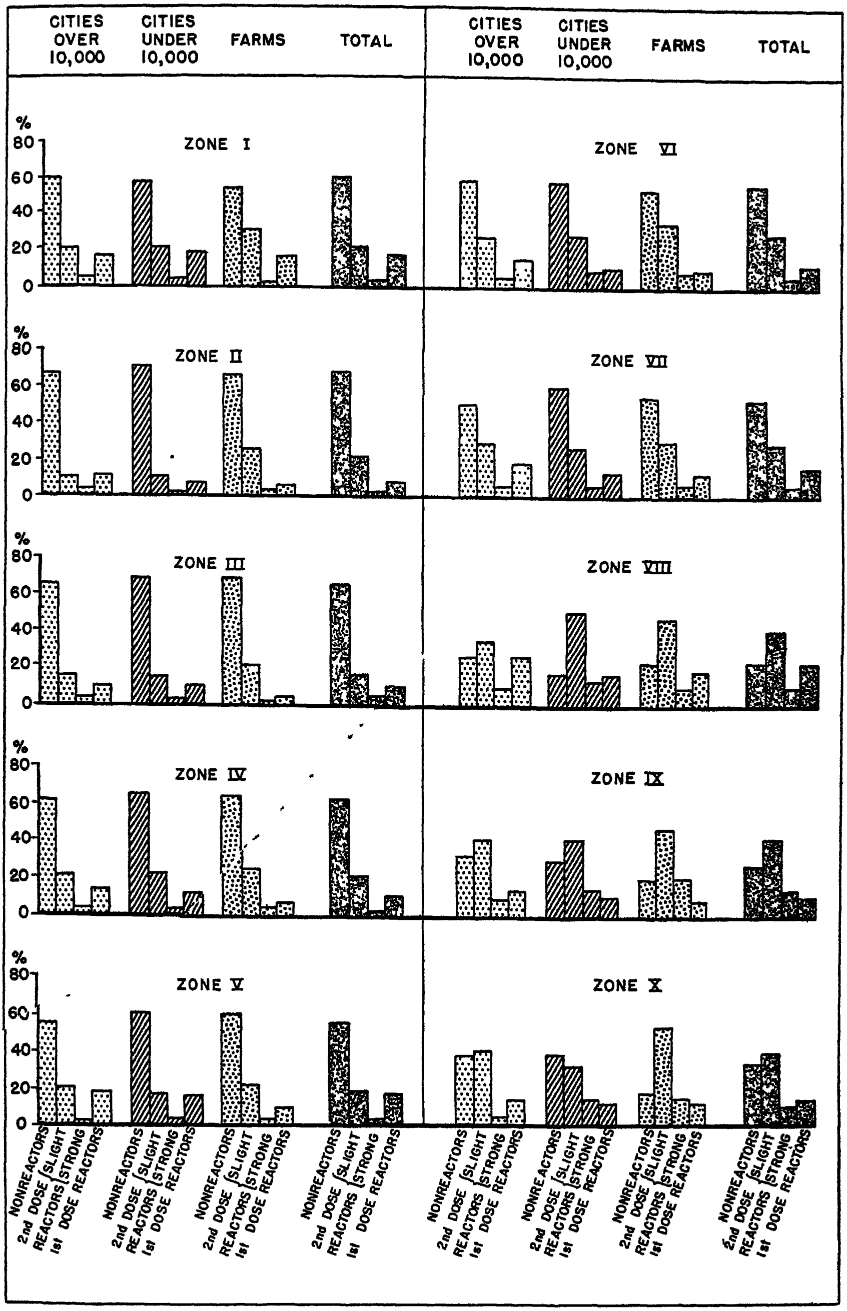

Figure 2. Distributions, according to tuberculin reaction, of lifetime residents from different types of communities in 10 zones of the United States.

nonreactors, but, in spite of these substantial differences, the U-shaped form of the distribution is not disturbed. There is an obvious similarity even between the two extremes, the distribution for nurses from farms in zone III (Michigan and Wisconsin) and those from the large cities in zone V (Pennsylvania, etc.), where the proportion of 1st dose reactors is 4.7 as against 18.7 percent. Actually the percentages of 2d dose reactors in these two groups are almost the same: 3.1 as against 3.4 for strong 2d dose reactors, and 21.7 as against 21.8 for slight 2d dose reactors.

While differences among the distributions in the left-hand side of the chart consist mainly of a transition of cases from one extreme to the other in the scale of tuberculin sensitivity, the histograms for zones VIII–X are distinctly of a different type. In all instances the middle part of the distribution is much more dominant. With one exception only, the modal class is found to be that for slight reactors to the 2d dose, and in several instances similarity to the U-shape has completely disappeared to be replaced by an almost symmetrical monomodal histogram, as in the distribution for nurses from rural districts in zone IX (Louisiana, etc.).

Also, the forms of the distributions for zones VIII–X are much less uniform than those for I–V. For instance, the distribution for the larger cities in zone VIII with the high prevalence of 1st dose reactors has not much resemblance to that for the farms of zone IX, but both deviate radically, because of the high percentage of strong and slight 2d dose reactors, from the typical form of histogram which described nurses in zones I–V. It should be noted especially that within the three southern zones there is not the same similarity between distributions from cities and from country as is found in the North.

If no evidence of a distinctly different type of distribution in the South had been available, the histogram for the Central States of zone VI and the mid-Atlantic States of zone VII would probably have been accepted without hesitation as belonging to the same type as found in zones I–V, in spite of the relatively high frequencies of both strong and slight 2d dose reactors. They do represent, however, the largest deviations found outside the South, possibly representing a transition between the two patterns.

A definite localization of a peculiar distribution of tuberculin sensitivity, manifested by an unusually frequent occurrence of reactions to a large dose of tuberculin, seems to be quite clear. A distortion of the distribution seems to take place within a certain limited geographic area, most violently in the center of this area, and more so for the rural than the urban subdivisions. The center of the "endemic" area appears to cover Louisiana, Mississippi, and presumably the adjoining States. East and west of this center, the frequencies of 2d dose reactors are a little smaller, and to the northeast and northwest, much lower.

It is obvious, of course, that the contours of the endemic area can be determined in only a very crude way with the material in the present study. The zones specifically outlined in figure 1 and the rates given for them must be viewed as first approximations. The initial sorting of the records was made by States only. Many of the States are represented by small numbers of nurses, and the frequencies are subject to large sampling errors. The possibility cannot be excluded that areas having high proportions of 2d dose reactors may be found in certain places outside of the South. The finding that within the large area comprising zones I–V the frequencies of 2d dose reactors did not show variations significantly different from random fluctuations, however, may be taken as some evidence against this possibility.

The observations on nurses with a lifetime residence in the South indicate that the high frequency of 2d dose reactors may be widespread over a large contiguous area, though it appears to be most common around the Mississippi delta. It is not possible to determine from the available data whether the somewhat lower proportions of 2d dose reactors toward the east and west is evidence of a gradual decrease in the prevalence or whether the center has sharp contours. If the latter is the case, the center may be supposed to cover all of zone IX, parts of zones VIII and X and stretch some way to the northeast and northwest.

Discussion

The preceding analysis has shown a certain simple pattern in the distribution of degrees of tuberculin sensitivity among student nurses from many different places representing most of the country outside of the southeast. This pattern can be interpreted according to principles presented in the preceding study (*5*) by visualizing the tested populations as composed of two groups: those who have been infected with the tubercle bacillus, and those who have not. If these two groups could be separated quite correctly without the use of the tuberculin test, each of them would provide its own characteristic form of frequency distribution of reactions. The former would include mostly typical reactions to a small dose and the latter mostly negative or slight degrees of sensitivity to the large dose, but both distributions would have a considerable dispersion and would overlap on a certain part of the scale. In the preceding study, the overlapping portion of the scale was shown to correspond approximately to strong 2d dose reactions.

An observed distribution of tuberculin reactions is determined, therefore, by the characteristics of the two components and by their relative magnitude, i. e., by the prevalence of tuberculous infection. While the prevalence varies considerably it may be a plausible working hypothesis to consider both components to be invariant, i. e., to assume: first, that the distribution according to sensitivity among those who have actually been infected is very much the same whether they constitute a large or small proportion of the total population; and, second, that those not infected have the same distribution of low level allergy in all areas.

Under these assumptions, changes in the prevalence of tuberculosis would alter the composite distribution as shown in figure 3, where distribution curves are drawn as rough illustrations without specified degrees of sensitivity. They demonstrate how increasing prevalence of infection changes the composite distribution. Observations are transferred from the nonreactor group to the group of 1st dose reactors without much change of the frequencies in the middle of the scale. The findings from many different places covering the larger part of

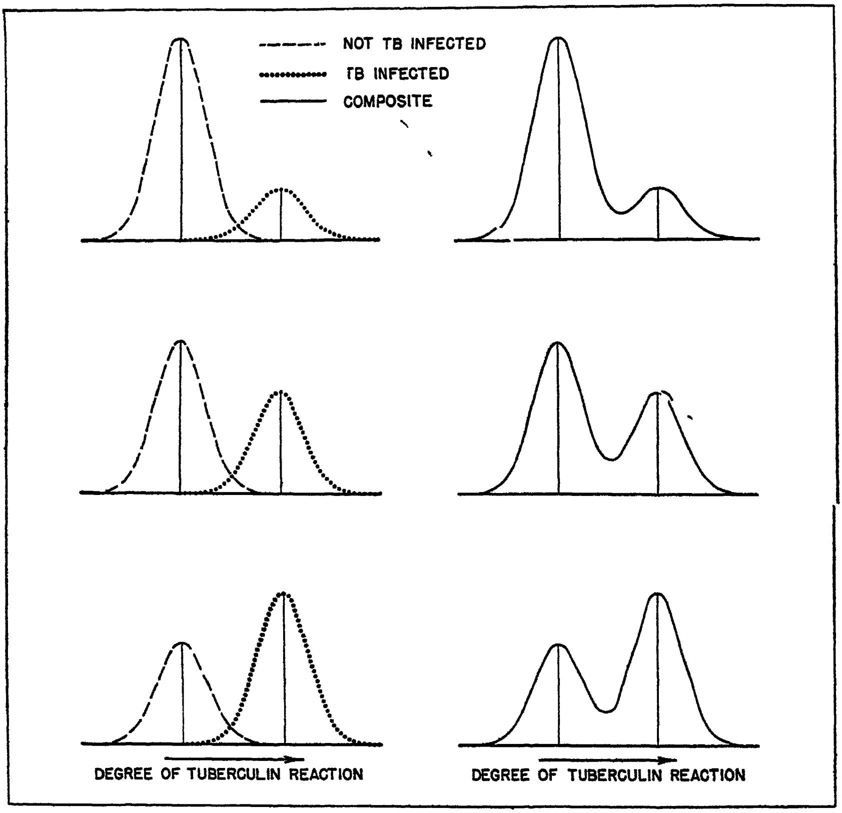

Figure 3. Hypothetical combination of two overlapping components into one composite frequency distribution according to degrees of tuberculin reaction for three populations with different prevalences of tuberculous infection.

the country conform with this model, supporting the view that the strong 2d dose reactors mainly represent cases in which the test has failed to discriminate unequivocally between positive and negative reactions.

The recognition of a certain margin of error does not impair the value of the tuberculin test when only a very small proportion of the population tested falls into the questionable category, which probably includes both persons infected with tuberculosis who failed to react to the first dose, and spurious reactors. It may be that tuberculous infections in a constant low proportion produce a very low degree of sensitivity, and we may speculate that there is a fairly constant "toxic" factor, a physiological reaction to an irritant unassociated with any specific response. In general, it might suffice to interpret the infrequent occurrence of strong 2d dose reactors in terms of experimental errors. The frequent interpretation that high dose reactions essentially represent a low level of specific sensitivity, resulting from a slight but true tuberculosis infection, seems unlikely in view of the almost complete lack of any association between their frequency and that of 1st dose reactors. It is most difficult to visualize how geographic factors could influence the prevalence of severe and slight infections in entirely different ways.

The diagnostic value of the tuberculin test, however, depends on the fact that unequivocal results are found in the very large majority of cases. The problem of erroneous classification becomes serious only when distributions are observed that deviate from the U-shaped model described above. Fortunately, so many populations do conform, that it appears justified to accept them as representative of a "normal" situation. As a consequence, the existence of divergent patterns of distribution calls for careful consideration and explanation. Distributions representative of the southern part of the country could be viewed as "distortions" of the normal form ,which must be explained either by a reduced level of sensitivity among the infected, or by the local existence of nonspecific allergy among those not infected with tuberculosis. The first explanation would necessitate the acceptance of the extremely complex consequences of the assumption that tuberculous infection in certain parts of the country fails to sensitize to the usual degree; the second appears much more acceptable.

The characteristic distribution found in the South may be explained by the superimposition of an additional component, i. e., a population composed of three groups instead of two: One, persons who have been infected with tuberculosis; another, noninfected persons; and a third, those with nonspecific allergy. Each group would represent a different level of sensitivity, and each would vary over a certain range, with considerable overlapping as illustrated in figure 4. In fact, the simplest, and most plausible explanation must be to assume that there

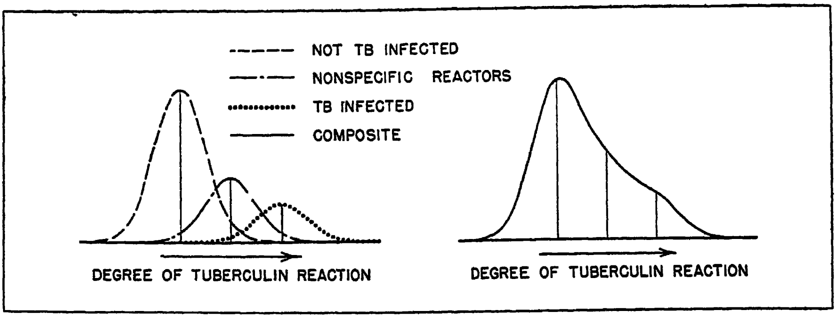

Figure 4. Hypothetical combination of three overlapping components into one composite frequency distribution according to degrees of tuberculin reaction.

exists among those not infected by tuberculosis, a substantial group of nonspecific reactors with a low level of sensitivity.

The most important evidence to support this hypothesis is, basically, the lack of correlation of the frequencies of 2d dose reactions with 1st dose reactions and with other evidence of tuberculosis. First, within major geographical subdivisions, especially in the entire northern and western segment of the country, the level of 2d dose sensitivity is remarkably uniform despite substantial variations in the percentages of 1st dose reactors. Second, from very broad geographic aspects, the existence of a definite endemic center of high prevalence of 2d dose reactors, apparently radiating outward from the Mississippi delta, is not at all closely related to the prevalence of tuberculosis. The third highly significant link in the evidence involves the marked reversal in the South of the urban-rural relationship in the frequency of low and high dose tuberculin reactors.

A nonspecific tuberculin sensitivity, while not related to tuberculous infection, must, when it occurs in sizeable segments of the tested population, indicate the existence of an unknown or not recognized agent.

Although speculations about the nature of this agent must be highly conjectural, the results of this study would appear at least to justify a serious search. That it might be infection with an organism allergenically resembling the tubercle bacillus was suggested in the preceding study (*5*). The most important clue now available is the general geographic localization of frequent 2d dose tuberculin sensitivity which appears to rule out the possibility of infection with the bovine or avian bacilli. In addition, it seems likely that the nonspecific sensitivity in the nurses tested was acquired before admission to training, suggesting that it was not temporary, and further, that the "infection" is highly benign and subclinical.

This localization and the urban-rural relationship would suggest certain geographical conditions like climate and vegetation as important factors rather than person-to-person contact as in tuberculosis The nonspecific reactions are found in an area of low level lands with subtropical vegetation, fairly hot and moist climate, a two-crop growing season, and a predominance of a peculiar soil described by geologists as "red or yellow podzolic soil."

Summary

The study is based on tuberculin tests, using a first dose of 0.0001 mg. and a second of 0.005 mg. of PPD-S, in a selected group of 10,000 white student nurses, who had lived essentially all of their lifetimes in single places in the United States. The distributions according to tuberculin sensitivity among residents from different localities were studied and compared as representative of geographic areas.

Reactions to the low dose, assumed to represent the most certain evidence of tuberculous infection, occurred with frequencies varying from about 5 to nearly 30 percent roughly in accordance with expected geographic variations in the prevalence of tuberculosis.

Reactions to the high dose, on the concrary, were strikingly independent of 1st dose reactions, and showed a peculiar geographic pattern. Throughout the greater part of the country, a remarkably constant proportion of about 24 percent of all residents reacted to the 2d dose in areas with high was well as in areas with low frequency of 1st dose reactors. In sharp contrast, however, the frequencies of high dose reactors were more than twice as high in a large contiguous area east of New Mexico and south of Kansas, Missouri, Kentucky, and Virginia, which at the same time includes parts with very high, with moderate, and with low prevalence of 1st dose reactors. The area showing the highest frequency of 2d dose reactors appears to center in Louisiana and Mississippi, with some indication of lower frequencies toward the east and west. Also the proportion of 2d dose reactors was higher in rural than in urban subdivisions in contrast to the proportions of 1st dose reactors. Among residents from Louisiana farms 72 percent responded to the 2d dose and only 9 percent to the 1st dose.

This evidence of a distinctly different pattern of tuberculin sensitivity predominant within a limited geographic region suggests the existence of a local widespread nonspecific sensitivity to tuberculin, possibly caused by infection by an organism allergenically related to the tubercle bacillus. While other hypotheses are not impossible they appear to involve very complex implications, and the most plausible explanation seems to be the existence of an unrecognized nonspecific factor within an endemic area centered around the Mississippi delta, covering roughly the southeastern quarter of the country.

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APPENDIX TABLE

Number of student nurses according to tuberculin reaction and place of lifetime residence

Zones and States	Total					All cities					Cities with more than 10,000 population [1]					Cities with less than 10,000 population [1]					Farm				
	Total	1st dose reactors	Strong 2d dose reactors	Slight 2d dose reactors	Nonreactors	Total	1st dose reactors	Strong 2d dose reactors	Slight 2d dose reactors	Nonreactors	Total	1st dose reactors	Strong 2d dose reactors	Slight 2d dose reactors	Nonreactors	Total	1st dose reactors	Strong 2d dose reactors	Slight 2d dose reactors	Nonreactors	Total	1st dose reactors	Strong 2d dose reactors	Slight 2d dose reactors	Nonreactors
Total United States	10,058	1,307	476	2,457	5,818	8,261	1,163	365	1,915	4,818	5,433	827	228	1,245	3,133	2,828	336	137	670	1,685	1,797	144	111	542	1,000
I																									
California	1,080	170	39	231	640	976	155	37	201	583	813	125	32	165	491	163	30	5	36	92	104	15	2	30	57
Washington	18	2	-----	3	13	15	2	-----	2	11	12	1	-----	2	9	3	1	-----	-----	2	3	-----	-----	1	2
Utah	6	2	-----	-----	4	6	2	-----	-----	4	4	2	-----	-----	2	2	-----	-----	-----	2	-----	-----	-----	-----	-----
New Mexico	18	4	1	2	11	17	4	1	2	10	10	4	-----	1	5	7	-----	1	1	5	1	-----	-----	-----	
Idaho	13	1	-----	3	9	6	-----	-----	-----	6	3	-----	-----	-----	3	3	-----	-----	-----	3	7	1	-----	3	3
Arizona	24	9	2	7	6	18	7	2	5	4	9	5	1	2	1	9	2	1	3	3	6	2	-----	2	2
Oregon	8	2	1	1	4	6	1	1	-----	4	5	1	1	-----	3	1	-----	-----	-----	1	2	1	-----	1	-----
Nevada	9	3	-----	1	5	8	3	-----	1	4	1	-----	-----	-----	1	7	3	-----	1	3	1	-----	-----	-----	1
II																									
Minnesota	1,143	81	27	261	774	797	66	17	167	547	416	41	11	84	280	381	25	6	83	267	346	15	10	94	227
Montana	29	2	1	6	20	18	1	1	3	13	8	1	1	1	5	10	-----	-----	2	8	11	1	-----	3	7
Wyoming	35	3	1	6	25	29	3	1	4	21	9	1	-----	1	7	20	2	1	3	14	6	-----	-----	2	4
North Dakota	101	6	2	20	73	63	3	1	15	44	16	-----	-----	5	11	47	3	1	10	33	38	3	1	5	29
South Dakota	87	11	3	15	58	38	6	-----	6	26	11	2	-----	1	8	27	4	-----	5	18	49	5	3	9	32
Iowa	118	13	1	20	84	79	9	1	12	57	30	6	1	6	17	49	3	-----	6	40	39	4	-----	8	27
III																									
Michigan	978	105	47	163	663	893	102	43	146	602	736	83	37	120	496	157	19	6	26	106	85	3	4	17	61
Wisconsin	144	13	2	25	104	100	10	2	14	74	35	5	-----	5	25	65	5	2	9	49	44	3	-----	11	30
IV																									
Ohio	959	96	25	214	624	760	85	16	166	493	455	56	12	98	289	305	29	4	68	204	199	11	9	48	131
Illinois	74	12	4	18	40	71	12	4	17	38	57	10	3	15	29	14	2	1	2	9	3	-----	-----	1	2
Kentucky	25	8	-----	9	8	14	5	-----	5	4	8	2	-----	3	3	6	3	-----	2	1	11	3	-----	4	4
Indiana	36	10	-----	2	24	35	10	-----	2	23	26	7	-----	1	18	9	3	-----	1	5	1	-----	-----	-----	1

See footnote at end of table.

Number of student nurses according to tuberculin reaction and place of lifetime residence—Continued

Zones and States	Total: Total	Total: 1st dose reactors	Total: Strong 2d dose reactors	Total: Slight 2d dose reactors	Total: Nonreactors	All cities: Total	All cities: 1st dose reactors	All cities: Strong 2d dose reactors	All cities: Slight 2d dose reactors	All cities: Nonreactors	Cities with more than 10,000 population[1]: Total	Cities with more than 10,000 population[1]: 1st dose reactors	Cities with more than 10,000 population[1]: Strong 2d dose reactors	Cities with more than 10,000 population[1]: Slight 2d dose reactors	Cities with more than 10,000 population[1]: Nonreactors	Cities with less than 10,000 population[1]: Total	Cities with less than 10,000 population[1]: 1st dose reactors	Cities with less than 10,000 population[1]: Strong 2d dose reactors	Cities with less than 10,000 population[1]: Slight 2d dose reactors	Cities with less than 10,000 population[1]: Nonreactors	Farm: Total	Farm: 1st dose reactors	Farm: Strong 2d dose reactors	Farm: Slight 2d dose reactors	Farm: Nonreactors
V																									
Pennsylvania	1,624	288	56	350	930	1,539	281	52	328	878	1,031	192	35	231	573	508	89	17	97	305	85	7	4	22	52
Vermont	1	----	----	----	1	1	----	----	----	1	----	----	----	----	----	1	----	----	----	1	----	----	----	----	----
Rhode Island	4	3	----	1	----	4	3	----	1	----	4	3	----	1	----	----	----	----	----	----	----	----	----	----	----
Connecticut	21	4	1	3	13	20	4	1	3	12	17	3	1	3	10	3	1	----	----	2	1	----	----	----	1
Maine	6	----	----	1	5	3	----	----	----	3	----	----	----	----	----	3	----	----	----	3	3	----	----	1	2
New Hampshire	2	1	----	----	1	2	1	----	----	1	1	1	----	----	----	1	----	----	----	1	----	----	----	----	----
Massachusetts	28	5	2	6	15	27	5	2	6	14	22	4	2	6	10	5	1	----	----	4	1	----	----	----	1
New York	157	28	4	26	99	149	26	4	26	93	133	22	4	25	82	16	4	----	1	11	8	2	----	----	6
New Jersey	74	12	1	12	49	64	9	1	10	41	32	7	----	4	21	32	2	1	6	23	10	3	----	2	5
VI																									
Kansas and Missouri	990	101	59	296	534	676	77	35	186	378	392	51	15	107	219	284	26	20	79	159	314	24	24	110	156
Colorado	168	21	9	38	100	125	20	6	24	75	68	13	2	10	43	57	7	4	14	32	43	1	3	14	25
Nebraska	89	8	7	20	54	54	5	6	11	32	14	2	2	2	8	40	3	4	9	24	35	3	1	9	22
VII																									
Maryland	803	124	43	222	414	719	116	39	197	367	557	98	30	160	269	162	18	9	37	98	84	8	4	25	47
Delaware	17	3	----	3	11	16	3	----	2	11	7	2	----	1	4	9	1	----	1	7	1	----	----	1	----
West Virginia	106	12	4	32	58	92	10	4	28	50	42	3	2	12	25	50	7	2	16	25	14	2	----	4	8
District of Columbia	52	9	2	15	26	51	9	2	14	26	51	9	2	14	26	----	----	----	----	----	1	----	----	1	----
Virginia	66	8	4	17	37	46	4	1	13	28	22	2	1	5	14	24	2	----	8	14	20	4	3	4	9
VIII																									
Texas	72	18	7	30	17	62	16	6	25	15	50	15	5	16	14	12	1	1	9	1	10	2	1	5	2
Oklahoma	34	7	4	14	9	23	5	3	9	6	12	2	1	6	3	11	3	2	3	3	11	2	1	5	3
IX																									
Louisiana	452	57	70	193	132	343	47	44	140	112	166	23	18	67	58	177	24	26	73	54	109	10	26	53	20
Mississippi	107	10	14	57	26	77	8	6	44	19	33	7	----	20	6	44	1	6	24	13	30	2	8	13	7
Arkansas	31	6	5	12	8	23	5	4	7	7	7	2	1	2	2	16	3	3	5	5	8	1	1	5	1
Tennessee	18	1	2	3	12	12	1	2	2	7	7	1	----	2	4	5	----	2	----	3	6	----	----	1	5
Alabama	43	2	6	22	13	36	1	6	10	13	23	1	4	9	9	13	----	2	7	4	7	1	----	6	----

X																								
Florida	103	18	12	41	32	87	15	9	32	31	42	10	3	16	13	45	5	6	16	18	16	3	3	9	1
South Carolina	23	2	1	13	7	17	2	1	9	5	11	1	-----	7	3	6	1	1	2	2	6	-----	-----	4	2
North Carolina	45	6	5	18	16	28	4	2	10	12	15	1	-----	7	7	13	3	2	3	5	17	2	3	8	4
Georgia	17	-----	2	5	10	16	-----	2	4	10	10	-----	1	2	7	6	-----	1	2	3	1	-----	-----	1	-----
SUMMARY BY ZONES																									
I	1,176	193	43	248	692	1,052	174	41	211	626	857	138	34	170	515	195	36	7	41	111	124	19	2	37	66
II	1,513	116	35	328	1,034	1,024	88	21	207	708	490	51	13	98	328	534	37	8	109	380	489	28	14	121	326
III	1,122	118	49	188	767	993	112	45	160	676	771	88	37	125	521	222	24	8	35	155	129	6	4	28	91
IV	1,094	126	29	243	696	880	112	20	190	558	546	75	15	117	339	334	37	5	73	219	214	14	9	53	138
V	1,917	341	64	399	1,113	1,309	329	60	374	1,046	1,240	232	42	270	696	569	97	18	104	350	108	12	4	25	67
VI	1,247	130	75	354	688	855	102	47	221	485	474	66	19	119	270	381	36	28	102	215	392	28	28	133	203
VII	1,044	156	53	289	546	924	142	46	254	482	679	114	35	192	338	245	28	11	62	144	120	14	7	35	64
VIII	106	25	11	44	26	85	21	9	34	21	62	17	6	22	17	23	4	3	12	4	21	4	2	10	5
IX	651	76	97	287	191	491	62	62	209	158	236	34	23	100	79	255	28	39	109	79	160	14	35	78	33
X	188	26	20	77	65	148	21	14	55	58	78	12	4	32	30	70	9	10	23	28	40	5	6	22	7
SUMMARY BY MAJOR AREAS																									
I-V	6,822	894	220	1,406	4,302	5,758	815	187	1,142	3,6[illegible]	3,904	584	141	780	2,399	1,854	231	46	362	1,215	1,064	79	33	264	688
VI-VII	2,291	286	128	643	1,234	1,779	244	93	475	967	153	180	51	311	608	626	64	39	164	359	512	42	35	168	267
VIII	945	127	128	408	282	724	104	85	298	237	76	63	33	154	126	348	41	52	144	111	221	23	43	110	45

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[1] According to the 1930 census.

Geographic Distribution of Pulmonary Calcification Among University Students in Ohio

By John A. Prior, M. D., John W. Wilce, M. D., and William Palchanis, M. D.*

In 1943, Long and Stearns (*1*) demonstrated a higher prevalence of pulmonary calcification among selective service inductees who were residents of the Middle West than among those from any other section of the country. Two years later, Palmer (*2*) and Christie and Peterson (*3*) reported on the first widespread use of the histoplasmin skin test. Their results indicate that most of the tuberculin negative persons who had pulmonary calcifications, especially in the Midwestern States, were reactors to histoplasmin. The following year, Palmer (*4*) demonstrated that there was a definite geographic pattern to the prevalence of histoplasmin reactors throughout the country. In the Midwest, 68.3 percent of those tested reacted to histoplasmin and the prevalence of reactors in contiguous areas was much lower. It will be noted that this area of high prevalence of calcified pulmonary lesions corresponds rather closely to the area of high prevalence of histoplasmin reactors, as well as to the endemic center of the reported cases of histoplasmosis.

Within States that lie on the border of this region of high prevalence of histoplasmin reactors, e. g., Ohio on the east and Kansas on the west, a definite geographic pattern of prevalence of histoplasmin reactors is noted (*4*). As one moves across these States away from the center of high prevalence, a rapid decline in prevalence of histoplasmin reactors is seen. In a histoplasmin and tuberculin survey of 5,087 Ohio State University freshmen and student nurses, representing every county in Ohio, conducted in 1946, the geographic pattern of histoplasmin reactors throughout the State was confirmed (*5*). That survey showed the prevalence of histoplasmin reactors in residents of southwestern Ohio to be very high, 75.8 percent, and that it steadily decreased to the north and east across the State, reaching the lowest prevalence, 16.8 percent, in the extreme northeastern section. No similar geographic distribution for tuberculin reactors was noted. Correlation of the skin test results with pulmonary calcifications was not possible at that time.

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It is the purpose of the present paper to report on the relationship of the presence of pulmonary calcification to the results of histoplasmin and tuberculin skin tests, as revealed by surveys conducted in the autumn of 1946 and 1948 among students entering Ohio State University.

Material and Method

The present study is based on the records of 4,829 students who entered Ohio State University in the fall quarters of 1946 and 1948 and met certain criteria. Preliminary histoplasmin and tuberculin skin tests were required, and a satisfactory chest film taken at the time of admission had to be available. The group was further limited to lifetime residents of a given county. As in the preceding study (*5*), a student was considered to be a lifetime resident of a county if he had not lived more than 4 years outside that county.

The 4,829 acceptable records were chosen from among more than 10,000 admissions in the specified periods. There were 3,844 males and 985 females. Only 640 were farm residents; the remaining 4,189 lived in nonfarm areas.

Skin tests consisted of the intradermal injection of 0.1 cc. histoplasmin (H-15) in 1:1000 dilution, and 0.1 cc. of tuberculin (PPD) containing 0.0001 mg. as advocated by Furcolow (*6*). Five mm. or more of induration at 48 hours was considered to be a positive reaction.

Routine 70 mm. chest X-rays were taken of each student when the skin tests were applied. To insure uniform interpretation, all of the X-rays were read by one of the authors (Prior) without the knowledge of the skin test reaction.

The authors recognize that 70 mm. films may not be entirely adequate for detecting the presence of pulmonary calcification. Further, the character of the calcification produced by histoplasmosis is believed by some workers to be larger, more discrete and well defined, hence more easily discernible, than some forms of tuberculous calcification. The figures cited, therefore, probably underestimate the absolute frequencies, perhaps more so for tuberculosis than for histoplasmosis. Nevertheless, they are useful in indicating relative levels among different geographic areas.

Results

Since the rates for histoplasmin reactors and calcified pulmonary lesions differed according to a definite geographic pattern throughout Ohio and because the numbers from some counties were too small to provide a reliable rate for the county, contiguous counties with similar rates were combined into 11 areas. For each of these areas the results of the skin tests and film reading are shown in table 1. The data

Table 1. *Number and percentage of "lifetime" students with pulmonary calcification in each reaction group by geographic areas, Ohio State University, fall 1946 and fall 1948*

Area number	Areas and large cities	H+ T+			H+ T−			H− T+			H− T−		
		Number of reactors	Number with calcification	Percent calcification	Number of reactors	Number with calcification	Percent calcification	Number of reactors	Number with calcification	Percent calcification	Number of reactors	Number with calcification	Percent calcification
	Total	308	71	23.1	2,049	432	21.1	373	24	6.4	2,099	73	3.5
1	Total	21	6	28.6	133	26	19.5	118	5	4.2	638	11	1.7
	Akron	1	------	0	18	3	16.7	10	------	0	55	2	3.6
	Cleveland	8	2	25.0	40	12	30.0	51	3	5.9	250	3	1.2
	Rest of area	12	4	33.3	75	11	14.7	57	2	3.5	333	6	1.8
2	Total	19	3	15.8	69	16	23.2	79	3	3.8	328	1	0.3
	Canton	3	------	0	11	2	18.2	14	1	7.1	57	1	1.8
	Youngstown	7	1	14.3	16	4	25.0	21	------	0	59	------	0
	Rest of area	9	2	22.2	42	10	23.8	44	2	4.6	212	------	0
3	Total	11	2	18.2	77	16	20.8	11	1	9.1	71	------	0
4	Total	7	2	28.6	80	16	20.0	30	1	3.3	151	4	2.6
5	Total	15	3	20.0	95	18	18.9	9	------	0	77	6	7.8
6	Total	13	3	23.1	88	18	20.5	11	2	18.2	52	3	5.8
7	Total	13	2	15.4	50	8	16.0	13	------	0	123	2	1.6
	Toledo	3	------	0	11	2	18.2	6	------	0	48	------	0
	Rest of area	10	2	20.0	39	6	15.4	7	------	0	75	2	2.7
8	Total	24	3	12.5	163	29	17.8	8	2	25.0	95	4	4.2
9	Total	130	35	26.9	878	182	20.7	71	8	11.3	436	33	7.6
	Columbus	80	27	33.8	528	116	22.0	58	7	12.1	313	19	6.1
	Rest of area	50	8	16.0	350	66	18.9	13	1	7.7	123	14	11.4
10	Total	14	4	28.6	116	30	25.9	7	------	0	47	3	6.4
11	Total	41	8	19.5	300	73	24.3	16	2	12.5	81	6	7.4
	Cincinnati	3	1	33.3	68	19	27.9	5	1	20.0	19	------	0
	Dayton	13	5	38.5	80	23	28.8	5	------	0	17	------	0
	Rest of area	25	2	8.0	152	31	20.4	6	1	16.7	45	6	13.3

derived from table 1 are presented in table 2 and these rates are used in the map of Ohio (fig. 1).

The distribution of histoplasmin reactors in this study of students whose chest X-rays were available is essentially the same as that already reported (*5*). In area 11, the histoplasmin reactor rate is

Table 2. *Percent of "lifetime" students in each geographic area with pulmonary calcification, percent reacting to histoplasmin and percent reacting to tuberculin, Ohio State University, fall 1946 and fall 1948*

Area	Calcification	Histoplasmin sensitivity	Tuberculin sensitivity
2	4.6	17.8	19.8
1	5.3	16.9	15.3
7	6.0	31.7	13.1
4	8.6	32.5	13.8
3	11.2	51.8	12.9
8	13.1	64.5	11.0
5	13.8	56.1	12.2
6	15.9	61.6	14.6
9	17.0	66.5	13.3
10	20.1	70.7	11.4
11	20.3	77.9	13.0

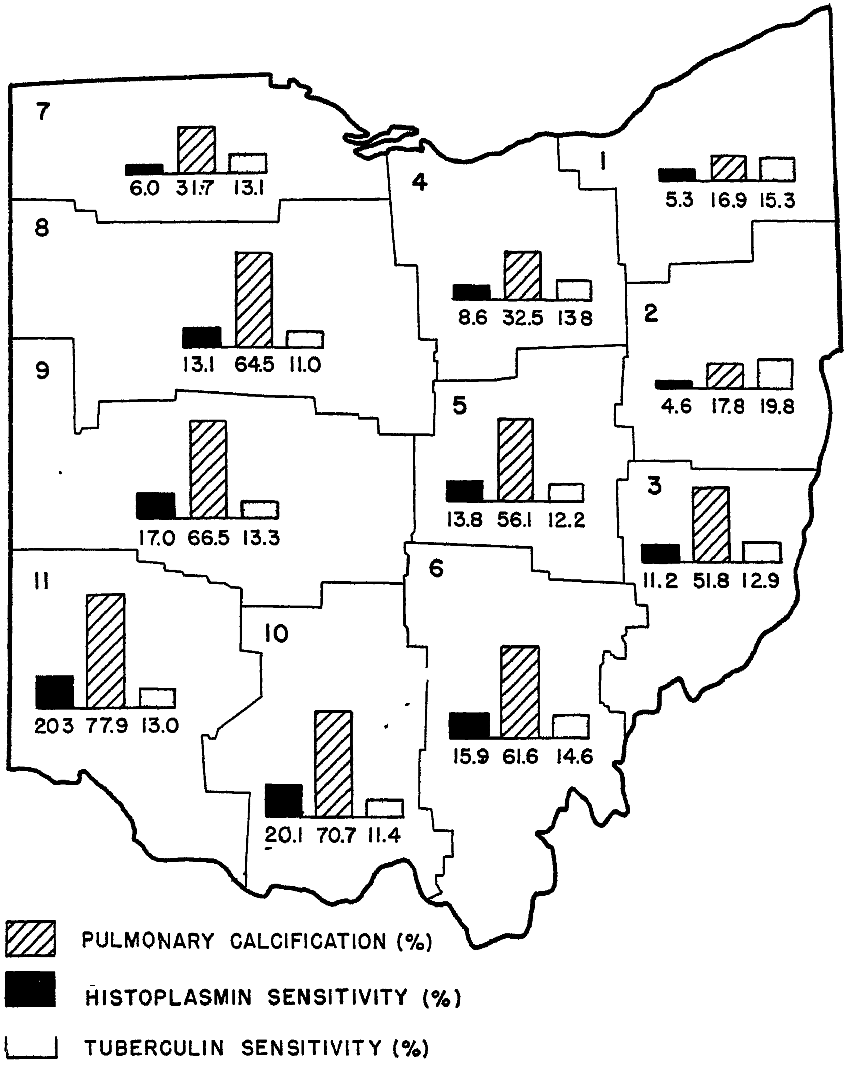

Figure 1. Percent of persons with pulmonary calcification, histoplasmin, and tuberculin sensitivity in 11 selected areas of Ohio.

highest, 77.9 percent. The prevalence gradually decreases across the State to the north and east, reaching a minimum of 16.9 percent in the northeastern corner. The average throughout Ohio is 48.8 percent. The prevalence of histoplasmin reactors in area 11 is approximately four and one-half times greater than in area 1. The prevalence of reactors among the male students is 49.6 percent, and among female students, 45.6 percent. The prevalence of reactors among students from farms is greater (60.6 percent) than among nonfarm residents (47 percent).

No similar pattern is noted for the prevalence of tuberculin reactors (fig. 1). It tends to be highest, 15.3 percent and 19.8 percent, in the most highly industrialized areas, 1 and 2, and lowest in the agricultural areas, 8 and 10—11.0 percent and 11.4 percent, respectively. The average for the State is 14.1 percent.

A definite geographic pattern for the incidence of pulmonary calcification is noted. The prevalence is greatest in the southwestern corner of the State in areas 10 and 11—20.1 percent and 20.3 percent, respectively. As one moves to the north and east across Ohio, the prevalence of such lesions gradually decreases, until it reaches a minimum in areas 1 and 2—5 3 percent and 4.6 percent, respectively. Thus, the prevalence of calcific pulmonary lesions in area 11 is approximately four times greater than in area 1. The average prevalence throughout the State is 12.4 percent.

When we return to the number and percentage of students with calcification in each reaction group by geographic area, as shown in table 1, it is seen that among students who reacted to tuberculin alone, only 6.4 percent showed the presence of calcified pulmonary lesions. Among those who reacted to histoplasmin alone, the prevalence of pulmonary calcification is considerably greater, 21.1 percent. The highest prevalence of pulmonary calcification, 23.1 percent is found among those who reacted to both histoplasmin and tuberculin. Among those who reacted to neither tuberculin nor histoplasmin, 3.5 percent had calcified lesions in their lungs. It would appear from

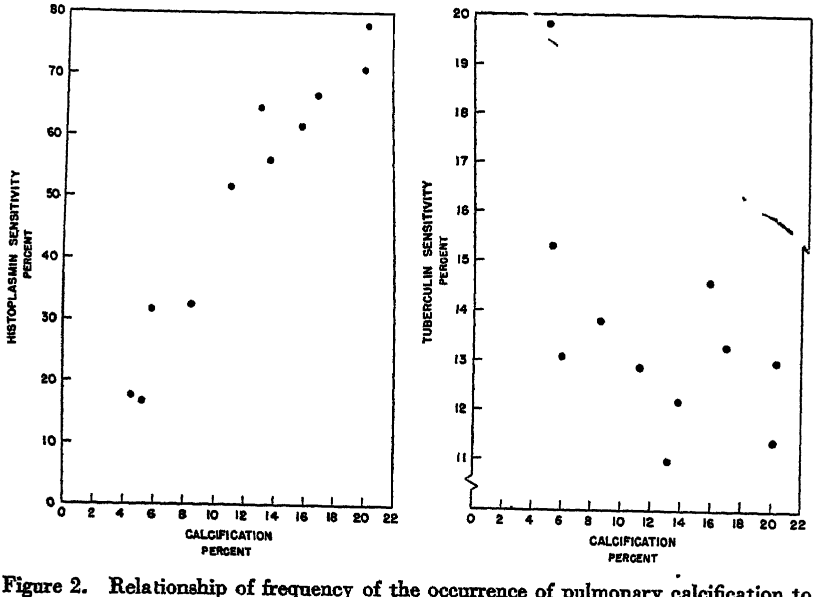

Figure 2. Relationship of frequency of the occurrence of pulmonary calcification to histoplasmin sensitivity and to tuberculin sensitivity in eleven selected areas of Ohio.

the data presented that pulmonary calcifications in Ohio are more commonly associated with histoplasmin sensitivity than with tuberculin sensitivity.

This conclusion is even more evident from an inspection of the scatter diagrams in figure 2. Using the data from table 2, the frequency of calcification has been plotted first against the frequency of histoplasmin reactors and then against the frequency of tuberculin reactors in each of the 11 areas. Although the correlation between the prevalence of calcification and of histoplasmin sensitivity is obvious, no such relationship appears to exist between calcification and tuberculin sensitivity.

A greater prevalence of calcified pulmonary lesions was found among male students, 12.9 percent, than among females, 10.3 percent. Calcifications were also more common among farm residents than among those from urban areas, 15.5 percent and 12.0 percent, respectively. These patterns are similar to those of histoplasmin sensitivity in these groups.

Summary and Conclusions

Studies of 4,829 students by means of chest X-ray, tuberculin, and histoplasmin tests, conducted in the fall of 1946 and 1948, demonstrated that the distribution of the prevalence of pulmonary calcification in Ohio followed a definite geographic pattern. This pattern of prevalence very closely parallels the geographic distribution of histoplasmin reactors, but does not correspond to the distribution of tuberculin reactors. The prevalence of tuberculin reactors tends to be higher in the metropolitan areas and lower in rural sections. In contrast, the prevalence of both pulmonary calcification and histoplasmin reactors tends to be higher in the rural sections than in urban areas, and also shows a definite geographic pattern. Although many calcifications are undoubtedly due to tuberculosis, these facts tend to support the growing belief that most pulmonary calcifications in Ohio and other Middle Western States are probably the result of a benign widespread form of histoplasmosis or an antigenically related agent or agents.

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Notice

The Index of Hospitals and Sanatoria with Tuberculosis Beds in the United States and Territories, as of January 1, 1950, issued this month by the Division of Tuberculosis, is now available for free distribution. Copies may be obtained upon request from the Publications Section, Division of Tuberculosis, Public Health Service, Washington 25, D. C.

Incidence of Disease

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occuring

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UNITED STATES

Reports from States for Week Ended August 12, 1950

For the current week, new cases of acute poliomyelitis reported in the Nation numbered 1,442, a 22-percent increase over the 1,186 reported last week. However, this rate of increase is roughly comparable to preceding weeks. The total for the current week is less than the 3,153 cases reported for the corresponding week in 1949.

The cumulative total, 7,610 cases of poliomyelitis reported for the current "disease" year, was below the corresponding total of 12,963 for last year, the highest on record. The "disease" year for acute poliomyelitis begins with the twelfth week of the calendar year.

The cumulative total for the calendar year was 8,744 reported cases of poliomyelitis compared with the total of 13,878 for the corresponding period last year.

Comparative Data for Cases of Specified Reportable Diseases: United States

[Numbers after diseases are International List numbers, 1948 revision]

Disease	Total for week ended—		5-year median 1945-49	Seasonal low week	Cumulative total since seasonal low week		5-year median 1944-45 through 1948-49	Cumulative total for calendar year		5-year median 1945-49
	Aug. 12, 1950	Aug. 13, 1949			1949-50	1948-49		1950	1949	
Anthrax (062)	-------	3	(1)	(1)	(1)	(1)	(1)	29	38	(1)
Diphtheria (055)	83	98	144	27th	322	464	663	3,450	4,232	6,960
Acute infectious encephalitis (082)	23	32	21	(1)	(1)	(1)	(1)	495	365	309
Influenza (480-483)	709	538	580	30th	1,568	1,046	1,046	247,827	76,913	140,197
Measles (085)	1,305	1,106	1,129	35th	304,795	638,873	582,899	285,665	586,480	547,953
Meningococcal meningitis (057.0)	41	48	48	37th	3,497	3,143	3,399	2,584	2,298	2,427
Pneumonia (490-493)	639	804	-------	(1)	(1)	(1)	--------	59,981	54,943	-------
Acute poliomyelitis (080)	1,442	3,153	1,409	11th	[2] 7,610	12,963	6,558	[2] 8,744	13,878	7,025
Rocky Mountain spotted fever (104)	23	36	29	(1)	(1)	(1)	(1)	322	413	382
Scarlet fever (050)	257	245	455	32d	56,609	80,210	88,789	40,170	57,666	62,103
Smallpox (084)	-------	1	2	35th	44	50	199	24	40	145
Tularemia (059)	19	23	22	(1)	(1)	(1)	(1)	631	781	641
Typhoid and paratyphoid fever [3] (040, 041)	105	182	140	11th	[4] 1,502	1,813	1,813	[4] 2,012	2,301	2,301
Whooping cough (056)	2,250	1,604	2,183	39th	105,588	46,743	88,432	84,052	36,710	62,414

[1] Not computed.

[2] Deductions—Arkansas, weeks ended July 22, and 29, 1 case each; Georgia, week ended August 5, 1 case.

[3] Including cases reported as salmonellosis.

[4] Deduction—Montana, week ended July 8, 2 cases.

For the current week, total poliomyelitis reported in all geographic divisions except the East South Central and Mountain increased over the preceding week. The increases ranged from 79 (168 to 247) cases reported in the Middle Atlantic States to 3 (199 to 202) cases in the East North Central States. The East South Central States decreased by 5 cases (117 to 112) and the Mountain States decreased by 2 (25 to 23).

For the current week, the States reporting the largest numbers of cases of poliomyelitis were: New York (172), Texas (131), Virginia (94), California (83), Illinois (69), and Michigan (66).

The total number of cases of influenza reported for the current week was 709, compared with 538 for the corresponding period last year. Of this current total, 522 cases were reported by Texas (378) and Virginia (144). The next highest number was reported by Arizona (45).

The total number of cases of infectious encephalitis reported for the week was 23, compared with 32 reported for the corresponding period last year. For the calendar year, a total of 495 cases was reported, the highest total in the past 5 years.

Total reported cases of scarlet fever were lower for the "disease" year ending with the current week than for any corresponding period during the past 5 years. This total was 56,609 which may be compared with 124,866 for 1945–46, the highest disease year in the 5-year period. The median for this period was 88,789.

No smallpox was reported in the United States.

The New Mexico State Health Department reports positive laboratory specimens for bubonic plague from an Arizona patient.

Deaths During Week Ended August 12, 1950

	Week ended August 12, 1950	*Corresponding week, 1949*
Data for 94 large cities of the United States:		
Total deaths	8,093	8,813
Median for 3 prior years	8,813	----------
Total deaths, first 32 weeks of year	298,951	299,285
Deaths under 1 year of age	606	741
Median for 3 prior years	686	----------
Deaths under 1 year of age, first 32 weeks of year	19,867	20,910
Data from industrial insurance companies:		
Policies in force	69,654,924	70,253,019
Number of death claims	12,092	11,175
Death claims per 1,000 policies in force, annual rate	9.1	8.3
Death claims per 1,000 policies, first 32 weeks of years, annual rate	9.5	9.4

Reported Cases of Selected Communicable Diseases: United States, Week Ended August 12, 1950

[Numbers under diseases are International List numbers, 1948 revision]

Area	Diphtheria (055)	Encephalitis, infectious (082)	Influenza (480–483)	Measles (085)	Meningitis, meningococcal (057.0)	Pneumonia (490–493)	Poliomyelitis (080)
United States	**83**	**23**	**709**	**1,305**	**41**	**639**	**1,442**
New England	**3**	**2**	----	**100**	**3**	**14**	**64**
Maine	1	----	----	4	----	----	5
New Hampshire	----	----	----	----	----	1	----
Vermont	----	----	----	3	----	----	2
Massachusetts	2	2	----	80	3	----	27
Rhode Island	----	----	----	----	----	----	1
Connecticut	----	----	----	13	----	13	29
Middle Atlantic	**5**	**1**	**1**	**389**	**7**	**176**	**247**
New York	1	1	[1] 1	163	2	115	172
New Jersey	1	----	----	124	----	35	30
Pennsylvania	3	----	----	102	5	26	45
East North Central	**6**	**3**	**15**	**352**	**10**	**67**	**202**
Ohio	----	----	3	70	3	7	25
Indiana	3	----	----	3	----	2	22
Illinois	3	2	----	104	2	39	69
Michigan	----	1	----	57	1	16	66
Wisconsin	----	----	12	118	4	3	20
West North Central	**2**	**2**	**8**	**65**	**4**	**77**	**186**
Minnesota	----	----	3	20	2	14	34
Iowa	----	----	----	1	1	----	72
Missouri	2	1	3	20	----	9	14
North Dakota	----	1	2	5	----	52	8
South Dakota	----	----	----	4	1	----	12
Nebraska	----	----	----	----	----	----	25
Kansas	----	----	----	15	----	2	21
South Atlantic	**12**	----	**163**	**84**	**3**	**72**	**267**
Delaware	----	----	----	----	----	----	2
Maryland	----	----	4	7	2	22	29
District of Columbia	----	----	2	3	----	15	15
Virginia	1	----	144	25	1	25	94
West Virginia	2	----	5	11	----	----	18
North Carolina	3	----	----	2	----	----	51
South Carolina	3	----	----	3	----	1	24
Georgia	2	----	8	25	----	3	17
Florida	1	----	----	8	----	6	17
East South Central	**27**	----	**14**	**49**	**7**	**31**	**112**
Kentucky	4	----	1	17	----	6	33
Tennessee	1	----	7	23	4	----	38
Alabama	6	----	3	5	2	9	18
Mississippi	16	----	3	4	1	16	23
West South Central	**21**	**1**	**413**	**126**	**5**	**170**	**215**
Arkansas	3	----	21	4	2	10	15
Louisiana	2	----	----	2	----	12	30
Oklahoma	2	----	14	5	1	11	39
Texas	14	1	378	115	2	137	131
Mountain	**2**	**2**	**82**	**70**	**1**	**17**	**23**
Montana	1	----	31	2	----	----	----
Idaho	----	----	2	11	----	----	2
Wyoming	----	----	----	----	----	----	2
Colorado	1	----	3	39	----	7	7
New Mexico	----	----	----	----	----	3	3
Arizona	----	----	45	5	1	6	7
Utah	----	2	1	13	----	1	2
Nevada	----	----	----	----	----	----	----
Pacific	**5**	**12**	**13**	**70**	**1**	**15**	**126**
Washington	1	----	----	7	----	----	20
Oregon	2	1	1	20	----	5	23
California	2	11	12	43	1	10	83
Alaska	----	----	----	----	----	----	----
Hawaii	----	----	24	4	----	----	----

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[1] New York City only.

Reported Cases of Selected Communicable Diseases: United States, Week Ended August 12, 1950—Continued

[Numbers under diseases are International List numbers, 1948 revision]

Area	Rocky Mountain spotted fever (104)	Scarlet fever (050)	Smallpox (084)	Tularemia (059)	Typhoid and paratyphoid fever [1] (040,041)	Whooping cough (056)	Rabies in animals
United States	23	257	---	19	105	2,250	115
New England	---	21	---	---	4	234	---
Maine	---	4	---	---	---	54	---
New Hampshire	---	---	---	---	---	1	---
Vermont	---	---	---	---	---	33	---
Massachusetts	---	10	---	---	2	80	---
Rhode Island	---	2	---	---	2	36	---
Connecticut	---	5	---	---	---	30	---
Middle Atlantic	---	45	---	---	12	349	32
New York	---	[2] 17	---	---	3	172	32
New Jersey	---	4	---	---	2	84	---
Pennsylvania	---	24	---	---	7	93	---
East North Central	---	57	---	1	17	491	30
Ohio	---	17	---	---	4	79	5
Indiana	---	4	---	1	8	26	[3] 19
Illinois	---	9	---	---	3	68	2
Michigan	---	19	---	---	1	193	3
Wisconsin	---	8	---	---	1	125	1
West North Central	---	16	---	---	5	121	7
Minnesota	---	4	---	---	1	37	---
Iowa	---	---	---	---	---	32	3
Missouri	---	8	---	---	4	30	---
North Dakota	---	1	---	---	---	1	---
South Dakota	---	---	---	---	---	4	---
Nebraska	---	---	---	---	---	---	---
Kansas	---	3	---	---	---	17	4
South Atlantic	19	40	---	1	18	394	13
Delaware	---	1	---	---	---	2	---
Maryland	6	6	---	---	2	63	---
District of Columbia	---	2	---	---	---	2	---
Virginia	10	7	---	---	6	58	1
West Virginia	1	2	---	---	1	89	1
North Carolina	2	16	---	---	3	148	---
South Carolina	---	2	---	---	3	7	5
Georgia	---	3	---	1	2	24	4
Florida	---	1	---	---	1	1	2
East South Central	1	30	---	2	13	77	14
Kentucky	1	6	---	---	4	21	5
Tennessee	---	14	---	2	7	37	2
Alabama	---	3	---	---	1	9	4
Mississippi	---	7	---	---	1	10	3
West South Central	---	12	---	12	21	273	15
Arkansas	---	1	---	10	3	45	1
Louisiana	---	1	---	1	2	---	---
Oklahoma	---	3	---	1	8	8	2
Texas	---	7	---	---	8	220	12
Mountain	2	6	---	3	4	149	---
Montana	---	---	---	---	---	15	---
Idaho	---	---	---	---	1	27	---
Wyoming	---	---	---	---	---	5	---
Colorado	2	2	---	---	2	41	---
New Mexico	---	---	---	1	1	21	---
Arizona	---	3	---	---	---	30	---
Utah	---	1	---	2	---	7	---
Nevada	---	---	---	---	---	3	---
Pacific	1	30	---	---	11	162	4
Washington	---	3	---	---	---	35	---
Oregon	1	2	---	---	---	24	---
California	---	25	---	---	11	103	4
Alaska	---	---	---	---	1	---	---
Hawaii	---	---	---	---	---	---	---

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[1] Including cases reported as salmonellosis.
[2] Including cases reported as streptococcal sore throat.
[3] Two weeks report.

FOREIGN REPORTS

CANADA

Reported Cases of Certain Diseases—Week Ended July 15, 1950

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Brucellosis					6	2	1		1		10
Chickenpox	1		14	1	51	139	16	18	61	57	358
Diphtheria					3						3
Dysentery:											
Amebic						1					1
Bacillary					5		1				6
Encephalitis, infectious						1					1
German measles			4		2	177	1	16	8	22	230
Influenza			1			8	1				10
Measles			10		168	304	6	14	24	82	608
Meningitis, meningococcal			1	1				2		1	5
Mumps			21		25	131	5	30	46	52	310
Poliomyelitis					1	3				2	6
Scarlet fever	8		2		11	15	5	4	10	3	58
Tuberculosis (all forms)	15		4	24	67	15	15	12	54		206
Typhoid and paratyphoid fever				2	6	2			1	2	13
Venereal diseases:											
Gonorrhea	4		11	4	78	58	29	8	55	102	349
Syphilis	2		19	2	25	11	5	6	2	11	83
Whooping cough	1		15	2	41	67	3	3	2	30	164

Week Ended July 22, 1950

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Brucellosis					4	1	1			1	7
Chickenpox			29		32	91	30	13	41	39	275
Diphtheria					3	1			1	1	6
Dysentery, bacillary					5		64			3	72
Encephalitis, infectious									2		2
German measles	3		16	3	2	73		7	11	31	146
Influenza			22				4				26
Measles			1		56	193	12	19	22	37	340
Meningitis, meningococcal						1	3		1		5
Mumps			16	1	11	84	7	28	52	32	231
Poliomyelitis				1	5		2	2	1	5	16
Scarlet fever			2		14	8	3	3	11	4	45
Tuberculosis (all forms)	8		9	20	131	6	30	9		74	287
Typhoid and paratyphoid fever					4	2				1	7
Venereal diseases:											
Gonorrhea	8		16	14	30	52	25	31	47	62	285
Syphilis			2	3	32	17	6	13	3	6	82
Whooping cough	3		32		37	35	3			36	146

GREAT BRITAIN

Poliomyelitis. The reported incidence of poliomyelitis in England and Wales during the current year has been markedly high. It is in excess of either of the epidemic years of 1947 or 1949. The epidemic of 1949 was second to that of 1947, but exceeded considerably those of pre-war years. A total of 7,791 cases was reported in 1947; 5,969 cases in 1949.

The total number of cases reported for the current year through week ended July 22 is 1,919 (corresponding figures for 1947, 1948, and 1949, respectively, 805, 789, and 847). The numbers of cases reported for the weeks ending in the period July 1 to July 22 are as follows (corresponding figures for 1947, 1948, and 1949, respectively, in parentheses): Weeks ended—July 1, 160 (67, 38, 81); July 8, 212 (88, 25, 77); July 15, 212 (126, 38, 117); July 22, 260 (193, 45, 99).

A similar situation exists in Scotland. Numbers of reported cases in recent weeks are as follows: Weeks ended—June 24, 37; July 1, 47; July 8, 42; July 15, 49; total for the four weeks, 175. Totals for the corresponding periods of 1947, 1948, and 1949 were 18, 10, and 13, respectively.

Numbers of cases reported in Northern Ireland during July 1950, are as follows (figures for 1949 in parentheses): Weeks ended—July 1, 10 (0); July 8, 10 (0); July 15, 12 (2); July 22, 18 (0).

MADAGASCAR

Reported Cases of Certain Diseases and Deaths—June 1950

Disease	Aliens		Natives	
	Cases	Deaths	Cases	Deaths
Beriberi			2	
Bilharziasis	1		104	2
Diphtheria	2		3	2
Dysentery:				
Amebic	14		293	3
Bacillary			2	
Erysipelas			19	
Influenza	80		11, 561	71
Leprosy	1		40	
Malaria	278		42, 705	89
Measles	8		95	
Mumps	6		254	
Plague			1	1
Pneumonia (all forms)	8	2	1, 193	234
Puerperal infection			10	
Relapsing fever			4	
Scarlet fever			1	
Tuberculosis, respiratory	9	1	113	17
Typhoid fever			1	
Whooping cough	6		376	6

NIGERIA

Cerebrospinal meningitis. Incidence of cerebrospinal meningitis has been reported in epidemic proportions in Nigeria during the current year. It is the highest ever recorded in that country. The maximum annual total of cases previously registered was that of 1949. During the period January 1–June 10, 1949, a total of 40,081 cases (7,757 deaths) was reported. The total number of reported cases for the same period of 1950 is 56,185 (7,056 deaths). More than half of the total for the period has been reported in Sokoto Province, where 28,935 cases have registered.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

Burma. During the week ended July 22, 1950, 40 cases of cholera, with 31 deaths, were reported.

India. The latest information on the epidemic of cholera in Bombay, received August 8, 1950, states that as of July 31, 217 cases, with 26 deaths, had been officially reported since the beginning of the outbreak on July 16. Epidemic incidence was also noted in Malad, a suburb of Bombay, and in Hubli, a city of 150,000 population, about three hundred miles southeast of Bombay, but no official reports of the numbers of cases occurring in these areas were available. For the week ended August 5, 58 cases were reported in Bombay. In Calcutta the outbreak reached its peak during the week ended April 22, with a total of 777 reported cases; 141 cases (51 deaths) were reported during the week ended July 29, and 115 cases for the week ended August 5. One fatal case was reported in Tiruchirappalli during the week ended July 29, the first this year.

Indochina. During the week ended July 29, 1950, 1 case of cholera was reported in the Longxuyen area, Viet Nam.

Plague

Belgian Congo. During the week ended July 29, 1950, 1 fatal case of plague was reported in Stanleyville Province at Julo, southwest of Blukwa.

Burma. On June 30, 1950, 1 case of plague was reported in the port of Minhla, and during the week ended July 22, 2 cases were reported in Rangoon.

Indonesia. During the week ended July 15, 1950, 9 fatal cases of plague were reported in Jogjakarta, Java.

Smallpox

Chile. During the outbreak of smallpox reported in Chile in recent months, 3,336 cases were recorded for the period January 1–May 27.

India. During the week ended August 5, 1950, 57 cases of smallpox were reported in Calcutta, and 46 cases in Madras.

Indonesia. In Surabaya, Java, 213 cases of smallpox were reported for the week ended July 15, 1950, and 193 cases for the week ended July 22. In Pontianak, Borneo, 27 cases were reported for the week ended July 8, and 21 cases for the week ended July 15.

Rhodesia (Southern). During the month of June 1950, 74 cases of smallpox (9 deaths) were reported in Southern Rhodesia.

Venezuela. During the period January 1–March 31, 1950, 706 cases of smallpox were reported in Venezuela.

Typhus Fever

Ecuador. During the month of June 1950, 43 cases of typhus fever, including murine type, were reported.

Jamaica. During the week ended July 29, 1950, 3 cases of typhus fever (murine type) were reported in Kingston.

Netherlands New Guinea. One case of typhus fever was reported in the port of Hollandia during the week ended July 15, 1950.

Errata

In the article "Effect of Formaldehyde on the Direct Microscopic Count of Raw Milk" by B. S. Levine, published in the July 28 issue, the entries in table 1, page 934 for "Significance of difference between means" should be changed as follows: "Not significant" should read "High" in both instances and "High" should read "Very high".

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The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

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Reported Cases of Selected Communicable Diseases: United States, Week Ended August 12, 1950

[Numbers under diseases are International List numbers, 1948 revision]

Area	Diphtheria (055)	Encephalitis, infectious (082)	Influenza (480–483)	Measles (085)	Meningitis, meningococcal (057.0)	Pneumonia (490–493)	Poliomyelitis (080)
United States	**83**	**23**	**709**	**1,305**	**41**	**639**	**1,442**
New England	**3**	**2**		**100**	**3**	**14**	**64**
Maine	1			4			5
New Hampshire						1	
Vermont				3			2
Massachusetts	2	2		80	3		27
Rhode Island							1
Connecticut				13		13	29
Middle Atlantic	**5**	**1**	**1**	**389**	**7**	**176**	**247**
New York	1	1	[1]1	163	2	115	172
New Jersey	1			124		35	30
Pennsylvania	3			102	5	26	45
East North Central	**6**	**3**	**15**	**352**	**10**	**67**	**202**
Ohio			3	70	3	7	25
Indiana	3			3		2	22
Illinois	3	2		104	2	39	69
Michigan		1		57	1	16	66
Wisconsin			12	118	4	3	20
West North Central	**2**	**2**	**8**	**65**	**4**	**77**	**186**
Minnesota			3	20	2	14	34
Iowa				1	1		72
Missouri	2	1	3	20		9	14
North Dakota		1	2	5		32	8
South Dakota				4	1		12
Nebraska							25
Kansas				15		2	21
South Atlantic	**12**		**163**	**84**	**3**	**72**	**267**
Delaware							2
Maryland			4	7	2	22	29
District of Columbia			2	3		15	15
Virginia	1		144	25	1	25	94
West Virginia	2		5	11			18
North Carolina	3			2			51
South Carolina	3			3		1	24
Georgia	2		8	25		3	17
Florida	1			8		6	17
East South Central	**27**		**14**	**49**	**7**	**31**	**112**
Kentucky	4		1	17		6	33
Tennessee	1		7	23	4		38
Alabama	6		3	5	2	9	18
Mississippi	16		3	4	1	16	23
West South Central	**21**	**1**	**413**	**126**	**5**	**170**	**215**
Arkansas	3		21	4	2	10	15
Louisiana	2			2		12	30
Oklahoma	2		14	5	1	11	39
Texas	14	1	378	115	2	137	131
Mountain	**2**	**2**	**82**	**70**	**1**	**17**	**23**
Montana	1		31	2			
Idaho			2	11			2
Wyoming							2
Colorado	1		3	39		7	7
New Mexico						3	3
Arizona			45	5	1	6	7
Utah		2	1	13		1	2
Nevada							
Pacific	**5**	**12**	**13**	**70**	**1**	**15**	**126**
Washington	1			7			20
Oregon	2	1	1	20		5	23
California	2	11	12	43	1	10	83
Alaska							
Hawaii			24	4			

[1] New York City only.

Reported Cases of Selected Communicable Diseases: United States, Week Ended August 12, 1950—Continued

[Numbers under diseases are International List numbers, 1918 revision]

Area	Rocky Mountain spotted fever (104)	Scarlet fever (050)	Smallpox (084)	Tularemia (059)	Typhoid and paratyphoid fever [1] (040,041)	Whooping cough (056)	Rabies in animals
United States	**23**	**257**		**19**	**105**	**2,250**	**115**
New England		**21**			**4**	**234**	
Maine		4				54	
New Hampshire						1	
Vermont						33	
Massachusetts		10			2	80	
Rhode Island		2			2	36	
Connecticut		5				30	
Middle Atlantic		**45**			**12**	**349**	**32**
New York		[2] 17			3	172	32
New Jersey		4			2	84	
Pennsylvania		24			7	93	
East North Central		**57**		**1**	**17**	**491**	**30**
Ohio		17			4	79	5
Indiana		4		1	8	26	[3] 19
Illinois		9			3	68	2
Michigan		19			1	193	3
Wisconsin		8			1	125	1
West North Central		**16**			**5**	**121**	**7**
Minnesota		4			1	37	
Iowa						32	3
Missouri		8			4	30	
North Dakota		1				1	
South Dakota						4	
Nebraska							
Kansas		3				17	4
South Atlantic	**19**	**40**		**1**	**18**	**394**	**13**
Delaware		1				2	
Maryland	6	6			2	63	
District of Columbia		2				2	
Virginia	10	7			6	58	1
West Virginia	1	2			1	89	1
North Carolina	2	16			3	148	
South Carolina		2			3	7	5
Georgia		3		1	2	24	4
Florida		1			1	1	2
East South Central	**1**	**30**		**2**	**13**	**77**	**14**
Kentucky	1	6			4	21	5
Tennessee		14		2	7	37	2
Alabama		3			1	9	4
Mississippi		7			1	10	3
West South Central		**12**		**12**	**21**	**273**	**15**
Arkansas		1		10	3	45	1
Louisiana		1		1	2		
Oklahoma		3		1	8	8	2
Texas		7			8	220	12
Mountain	**2**	**6**		**3**	**4**	**149**	
Montana						15	
Idaho					1	27	
Wyoming						5	
Colorado	2	2			2	41	
New Mexico				1	1	21	
Arizona		3				30	
Utah		1		2		7	
Nevada						3	
Pacific	**1**	**30**			**11**	**162**	**4**
Washington		3				35	
Oregon	1	2				24	
California		25			11	103	4
Alaska					1		
Hawaii							

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[1] Including cases reported as salmonellosis.
[2] Including cases reported as streptococcal sore throat.
[3] Two weeks report.

FOREIGN REPORTS

CANADA

Reported Cases of Certain Diseases—Week Ended July 15, 1950

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Brucellosis					6	2	1		1		10
Chickenpox	1		11	1	51	139	16	18	61	57	355
Diphtheria					3						3
Dysentery:											
Amebic						1					1
Bacillary					5		1				6
Encephalitis, infectious						1					1
German measles			4		2	177	1	16	8	22	230
Influenza			1			8	1				10
Measles			10		168	304	6	14	24	82	608
Meningitis, meningococcal			1	1				2		1	5
Mumps			21		25	131	5	30	46	52	310
Poliomyelitis					1	3				2	6
Scarlet fever	8		2		11	15	5	4	10	3	58
Tuberculosis (all forms)	15		4	24	67	15	15	12	54		206
Typhoid and paratyphoid fever				2	6	2			1	2	13
Venereal diseases:											
Gonorrhea	4		11	4	78	58	29	8	55	102	349
Syphilis	2		19	2	25	11	5	6	2	11	83
Whooping cough	1		15	2	41	67	3	3	2	30	164

Week Ended July 22, 1950

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Brucellosis					4	1	1			1	7
Chickenpox			29		32	91	30	13	41	39	275
Diphtheria					3	1			1	1	6
Dysentery, bacillary					5		64			3	72
Encephalitis, infectious									2		2
German measles	3		16	3	2	73		7	11	31	146
Influenza			22				4				26
Measles			1		56	193	12	19	22	37	340
Meningitis, meningococcal						1	3		1		5
Mumps			16	1	11	84	7	28	52	32	231
Poliomyelitis				1	5		2	2	1	5	16
Scarlet fever			2		14	8	3	3	11	4	45
Tuberculosis (all forms)	8		9	20	131	6	30	9		74	287
Typhoid and paratyphoid fever					4	2				1	7
Venereal diseases:											
Gonorrhea	8		16	14	30	52	25	31	47	62	285
Syphilis			2	3	32	17	6	13	3	6	82
Whooping cough	3		32		37	35	3			36	146

GREAT BRITAIN

Poliomyelitis. The reported incidence of poliomyelitis in England and Wales during the current year has been markedly high. It is in excess of either of the epidemic years of 1947 or 1949. The epidemic of 1949 was second to that of 1947, but exceeded considerably those of pre-war years. A total of 7,791 cases was reported in 1947; 5,969 cases in 1949.

The total number of cases reported for the current year through week ended July 22 is 1,919 (corresponding figures for 1947, 1948, and 1949, respectively, 805, 789, and 847). The numbers of cases reported for the weeks ending in the period July 1 to July 22 are as follows (corresponding figures for 1947, 1948, and 1949, respectively, in parentheses): Weeks ended—July 1, 160 (67, 38, 81); July 8, 212 (88, 25, 77); July 15, 212 (126, 38, 117); July 22, 260 (193, 45, 99).

A similar situation exists in Scotland. Numbers of reported cases in recent weeks are as follows: Weeks ended—June 24, 37; July 1, 47; July 8, 42; July 15, 49; total for the four weeks, 175. Totals for the corresponding periods of 1947, 1948, and 1949 were 18, 10, and 13, respectively.

Numbers of cases reported in Northern Ireland during July 1950, are as follows (figures for 1949 in parentheses): Weeks ended—July 1, 10 (0); July 8, 10 (0); July 15, 12 (2); July 22, 18 (0).

MADAGASCAR

Reported Cases of Certain Diseases and Deaths—June 1950

Disease	Aliens		Natives	
	Cases	Deaths	Cases	Deaths
Beriberi	-----	-----	2	-----
Bilharziasis	1	-----	104	2
Diphtheria	2	-----	3	2
Dysentery:				
Amebic	14	-----	293	3
Bacillary	-----	-----	2	-----
Erysipelas	-----	-----	19	-----
Influenza	80	-----	11,561	71
Leprosy	1	-----	40	-----
Malaria	278	-----	42,705	89
Measles	8	-----	95	-----
Mumps	6	-----	254	-----
Plague	-----	-----	1	1
Pneumonia (all forms)	8	2	1,193	234
Puerperal infection	-----	-----	10	-----
Relapsing fever	-----	-----	4	-----
Scarlet fever	-----	-----	1	-----
Tuberculosis, respiratory	9	1	113	17
Typhoid fever	-----	-----	1	-----
Whooping cough	6	-----	376	6

NIGERIA

Cerebrospinal meningitis. Incidence of cerebrospinal meningitis has been reported in epidemic proportions in Nigeria during the current year. It is the highest ever recorded in that country. The maximum annual total of cases previously registered was that of 1949. During the period January 1–June 10, 1949, a total of 40,081 cases (7,757 deaths) was reported. The total number of reported cases for the same period of 1950 is 56,185 (7,056 deaths). More than half of the total for the period has been reported in Sokoto Province, where 28,935 cases have registered.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

Burma. During the week ended July 22, 1950, 40 cases of cholera, with 31 deaths, were reported.

India. The latest information on the epidemic of cholera in Bombay, received August 8, 1950, states that as of July 31, 217 cases, with 26 deaths, had been officially reported since the beginning of the outbreak on July 16. Epidemic incidence was also noted in Malad, a suburb of Bombay, and in Hubli, a city of 150,000 population, about three hundred miles southeast of Bombay, but no official reports of the numbers of cases occurring in these areas were available. For the week ended August 5, 58 cases were reported in Bombay. In Calcutta the outbreak reached its peak during the week ended April 22, with a total of 777 reported cases; 141 cases (51 deaths) were reported during the week ended July 29, and 115 cases for the week ended August 5. One fatal case was reported in Tiruchirappalli during the week ended July 29, the first this year.

Indochina. During the week ended July 29, 1950, 1 case of cholera was reported in the Longxuyen area, Viet Nam.

Plague

Belgian Congo. During the week ended July 29, 1950, 1 fatal case of plague was reported in Stanleyville Province at Julo, southwest of Blukwa.

Burma. On June 30, 1950, 1 case of plague was reported in the port of Minhla, and during the week ended July 22, 2 cases were reported in Rangoon.

Indonesia. During the week ended July 15, 1950, 9 fatal cases of plague were reported in Jogjakarta, Java.

Smallpox

Chile. During the outbreak of smallpox reported in Chile in recent months, 3,336 cases were recorded for the period January 1–May 27.

India. During the week ended August 5, 1950, 57 cases of smallpox were reported in Calcutta, and 46 cases in Madras.

Indonesia. In Surabaya, Java, 213 cases of smallpox were reported for the week ended July 15, 1950, and 193 cases for the week ended July 22. In Pontianak, Borneo, 27 cases were reported for the week ended July 8, and 21 cases for the week ended July 15.

Rhodesia (Southern). During the month of June 1950, 74 cases of smallpox (9 deaths) were reported in Southern Rhodesia.

Venezuela. During the period January 1–March 31, 1950, 706 cases of smallpox were reported in Venezuela.

Typhus Fever

Ecuador. During the month of June 1950, 43 cases of typhus fever, including murine type, were reported.

Jamaica. During the week ended July 29, 1950, 3 cases of typhus fever (murine type) were reported in Kingston.

Netherlands New Guinea. One case of typhus fever was reported in the port of Hollandia during the week ended July 15, 1950.

Errata

In the article "Effect of Formaldehyde on the Direct Microscopic Count of Raw Milk" by B. S. Levine, published in the July 28 issue, the entries in table 1, page 934 for "Significance of difference between means" should be changed as follows: "Not significant" should read "High" in both instances and "High" should read "Very high".

* * *

The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

VOLUME 65 SEPTEMBER 8, 1950 NUMBER 36

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Leprosy Relapse After Sulfone Therapy

Communicable Diseases, Second Quarter, 1950

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY

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Public Health Reports

Vol. 65 • SEPTEMBER 8, 1950 • *No. 36*

Relapse Following Apparent Arrest of Leprosy by Sulfone Therapy

By Paul T. Erickson, M. D.*

The tendency toward relapse following arrest of lepromatous leprosy by chaulmoogra oil therapy has been disappointingly high (*1*, *2*). Although the sulfone drugs, promin and diasone, are generally considered superior to chaulmoogra oil for producing regression of specific leprous lesions and for arresting the disease, sufficient time has not elapsed for a comparative determination of the trend toward relapse (*3*). At least, up to the present, there have been no specific reports dealing with this subject in medical literature.

Of special interest, therefore, is the recent discovery at Carville of reactivation of the disease in six patients in whom the disease was supposedly arrested by sulfone treatment. Three of these patients showed a reappearance of leprosy bacilli in the skin without any other manifestations of the disease. Thus, they are termed subclinical relapses. The remainder presented, in addition, unquestionable leprous skin lesions or a true clinical relapse of the disease.

This paper reports these first cases of reactivation of leprosy following sulfone therapy and reviews the status of the sulfone-treated patients whom it has been possible to follow after apparent arrest of the disease. The criteria utilized for determination of arrest are described. The type, amount, and duration of treatment given to those patients in whom relapse occurred is compared to the average given to the entire group of patients who were followed. Finally, from the conclusions drawn, recommendations for the management of arrested cases of leprosy are discussed.

Criteria for Arrest

The criteria by which the reactivated cases reported here were at one time classified as arrested cases are those routinely employed at Carville. Briefly, they are as follows for lepromatous cases:

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1. Skin smears performed at monthly intervals must be negative for *Mycobacterium lepra* consecutively for a period of 1 year.
2. There must not be any evidence of clinical activity of the disease during the 1-year period of negativity.

The monthly skin smears, performed by scraping the edges of a small incision into the skin about 2 millimeters deep and staining the scrapings with an acid-fast stain, are taken by the bacteriologist from areas found positive for leprosy bacilli at the original examination. When the patient has shown negative skin scrapings from these areas for a period of 3 months, he is given a special examination by a board of physicians. A thorough inspection of the entire skin surface is made. Skin smears are taken at this examination from lesions which from their appearance suggest activity. Routine scrapings from the ear lobes, forehead, elbows, and nasal mucosa are also examined for acid-fast bacilli. If all the smears are negative, monthly smears are continued on the originally positive skin areas, and the special examination is repeated every 3 months. Whenever leprosy bacilli are found in any of the smears taken, even if the patient has had a long series of negative skin smears, he is required to begin anew on another series of tests when the first negative smear is obtained following a positive result. When, under this regime, a patient has been negative for a period of 1 year, a final examination is performed by the board of physicians. If all the smears are then negative and no evidence of activity has been present for 1 year, the disease is considered to be arrested.

The concentration of bacilli found in the skin and nasal smears are classified according to number as follows:

0	or negative	No bacilli found.
1+	or rare	Less than 1 bacillus per microscopic field.[*]
2+	or few	1–10 bacilli per microscopic field.
3+	or moderate	10–50 bacilli per microscopic field.
4+	or numerous	More than 50 bacilli per microscopic field.

[*] Oil immersion 960X.

Although these criteria for arrest are not as rigid as those observed by most leprologists in other countries, it is felt that they give a fairly good indication of inactivity of the disease.

Follow-Up

Sulfone therapy was first begun at Carville in March 1941. Three years later, in April 1944, the first sulfone-treated patients fulfilled the criteria for arrest of the disease. Since that date a total of 77 patients who had active disease when treatment was begun have had the disease arrested by sulfone drugs. Up to July 1, 1949, it has been possible, unfortunately, to keep only 33 of these patients under observation with routine clinical and laboratory examinations. These patients, all of the lepromatous type, form the basis for this report. The duration of follow-up varied from 6 months to 5 years.

It has been the practice at Carville to continue sulfone therapy for those patients who desire to continue treatment after apparent arrest of the disease. Thus, among the patients followed, 22 patients received promin or diasone either continuously or interruptedly after arrest. The majority of these received the drugs in smaller doses than that given during active treatment. Eleven patients received no antileprotic remedy after arrest of the disease.

The type of treatment and the average amount and duration of treatment given before the disease was arrested are summarized in table 1. Twenty-one patients each received an average of 2,840.5 gm. of promin for an average duration of 45 months; eight patients each received an average of 602.5 gm. of diasone for an average duration of 39 months; and four patients received, alternatingly, promin and diasone, an average of 393 gms. diasone and 1,262 gms. promin for an average duration of 49 months.

Table 1. *Relapses found according to amount, duration, and type of sulfone treatment received by 33 patients prior to arrest of disease*

Type of treatment	Number patients followed	Number and percent relapses found	Average amt. of treatment (gms.)	Average duration of treatment (months)
Promin	21	4 (19%)	2,840.5	45
Diasone	8	2 (25%)	602 5	39
Alternating	4	0		49
Promin			1,262 0	
Diasone			393 0	

Among the patients who received promin, four cases of relapse occurred—two clinical and two subclinical. One clinical and one subclinical relapse occurred among the patients who received diasone. Thus, a total of six relapses occurred among the 33 patients followed. The percentage of patients experiencing relapse was approximately the same in the promin-treated group (19 percent) as in the diasone-treated group (25 percent). There were no instances of relapse among the four patients receiving promin and diasone, alternatingly, but the number of patients followed is so small as to make this observation insignificant.

REPORT OF CASES

Case 1. The patient, a white male, aged 27, began promin treatment June 3, 1942. At that time, he had had recognizable lesions of leprosy for 3 years, which consisted of infiltrated, circinate macules of the torso and upper extremities, diffuse thickening of the face, and scattered nodules over the face and extremities. The ulnar nerves were palpable and tender. There was loss of pain sensation over the ulnar side of the forearms, lower part of the legs, feet, and hands as well as over the specific skin lesions. Bacterioscopic examinations of skin and nasal mucous membrane were positive (3+). The lepromin test was negative.

During the course of treatment there occurred several febrile episodes associated with erythema nodosum and neuritis. At one time (1944) a left iridocyclitis complicated the usual type of reaction. The specific skin and mucous membrane lesions underwent resolution in the usual time. The criteria for arrest of the disease were fulfilled on July 18, 1945, after the patient had received 3,402.5 gm. promin intravenously for a period of 3 years, 2 months.

The patient was discharged from the hospital after arrest of the disease and treatment was discontinued. He was well until December 1947 when red spots began to appear over the body. This was 29 months following arrest of the disease. He was readmitted to Carville April 20, 1948. Scattered plaques and macules, varying in color from coral to tan, were found over the torso and extremities. An ulcerated area was found on the right side of the nasal septum. Bacterioscopic examinations of skin and nasal mucous membrane were positive (2+ and 1+, respectively). Regression of lesions occurred with the resumption of promin treatment.

Case 2. The patient, a white male, aged 35, began promin treatment in July 1942. At that time he had had recognizable lesions of leprosy for 7 years, consisting of diffuse thickening of the face, brow, and ears; medium-sized, copper-colored, infiltrated macules scattered over the face, extremities, and torso; thickened ulnar, peroneal, and great auricular nerves; moderate interosseous atrophy of hands, extensive anesthesia of extremities, and a weak right ankle. Bacterioscopic examinations of skin and mucous membrane were positive (3+). The lepromin test was negative.

During the course of treatment, erythema nodosum, neuritis, and fever occurred at infrequent intervals. Otherwise, response to treatment was that usually experienced. The criteria for arrest of the disease were fulfilled on October 9, 1946, after the patient had received 3,685.5 gm. of promin intravenously for a period of 4 years 3 months.

The patient was discharged from the hospital after arrest of the disease; treatment was discontinued. He had his first bacteriologic check-up 17 months later (February 1948) and acid-fast bacilli were found in the skin. In September 1948 he developed chills, fever, general weakness, and skin lesions on the chest. In January 1949 he returned to Carville for further treatment. There were present at that time a rather marked infiltration of the face, brow, and ears; many copper-colored, infiltrated macules scattered over the chest, back, buttocks, and extremities; extensive anesthesia of extremities; marked atrophy of the intrinsic muscles of the left hand with contracture; and thickening of the ulnar, peroneal, and great auricular nerves. Regression of skin and mucous membrane lesions occurred on promacetin treatment.

Case 3. The patient, a white male, aged 60, began promin treatment on October 1, 1943. At that time he had had recognizable leprous lesions for 5 years, consisting of a generalized eruption of large, infiltrated, red, raised macules on the extremities and body; diffuse thickening of the face, brow, ears, hands, lower portion of legs, and feet; enlarged, tender ulnar nerves; slight atrophy of the intrinsic muscles of hands; extensive anesthesia, stocking and glove-like, including knees and elbows; and generalized adenopathy. Bacterioscopic examinations of skin and mucous membranes were positive (4+). The lepromin test was negative.

During the course of treatment a number of febrile episodes with erythema nodosum occurred between August 30, 1944 and December 1, 1944. Otherwise, response to treatment was uneventful and skin lesions resolved in due time. The criteria for arrest were fulfilled on February 3, 1948, after the patient had received 3,285.5 gm. of promin intravenously for a period of 4 years 4 months.

The patient was discharged from the hospital after arrest of the disease; treatment was discontinued. He returned to Carville on July 29, 1948, for treatment of infected trophic ulcers of the feet. Bacterioscopic examinations were positive (skin 1+ and nasal mucosa 1+), although there were no visible or palpable skin lesions.

CASE 4. The patient, a white male, aged 53, began promin treatment in July 1942. At that time he had had recognizable leprous lesions for 5 years, consisting of multiple, pea-sized nodules over the cheeks and forehead, both arms, and both legs; diffuse thickening of the skin of the face and extremities; thickened ulnar and peroneal nerves; loss of pain sensation of entire left upper extremity, dorsum of right hand, and both legs; moderate injection of both eyes from leprous iridocyclitis; and ulceration of the nasal mucous membrane. Bacterioscopic examinations of the skin and nasal mucous membrane were positive (4+). The lepromin test was negative.

Improvement on promin therapy was slow but definite. There were occasional episodes of erythema nodosum with fever. The criteria for arrest were fulfilled on March 31, 1947, after the patient had received 1,441 gm. of promin intravenously for a period of 4 years 9 months.

The patient was discharged from the hospital after arrest of the disease and treatment was discontinued. A personal communication from a leprosarium in Mexico City, Mexico, during April 1948 gave information that the patient had recently been examined there and found to show positive skin smears.

CASE 5. The patient, a white male, aged 60, began diasone treatment August 9, 1943. At that time he had had recognizable lesions of leprosy for an unknown duration, consisting of diffuse thickening of the face, brow, and ears; enlargement of the ulnar nerves; and scattered areas of anesthesia of the upper part of both arms. Bacterioscopic examinations of skin and nasal mucous membrane were positive (3+). The lepromin test was negative.

During the course of treatment there were occasional febrile episodes associated with erythema nodosum. Neuritis occurred frequently. Clinical improvement was gradual and the criteria for arrest of the disease were fulfilled November 15, 1946, after the patient had received 575 gm. of diasone orally for a period of 3 years 3 months.

The patient was discharged from the hospital after arrest of the disease; treatment was discontinued. He had his first follow-up examination approximately 3 years later. Skin smears from the right ear and right brow were positive (2+) for leprosy bacilli and both ear lobes presented slight infiltration and erythema.

CASE 6. The patient, a Negro male, aged 35, began diasone treatment on November 11, 1944. At that time he had had recognizable leprous lesions for 4 years, consisting of pea-sized nodules of the face and ears; patches of infiltrated skin over the back; thickened ulnar and peroneal nerves; impairment of pain sensation over the legs, feet, and hands; enlarged femoral and inguinal glands; and ulceration of the nasal mucous membrane. Bacterioscopic examinations of the skin and nasal mucous membrane were positive (4+). The lepromin test was not made.

Response to diasone treatment was rapid. Slight febrile reactions with erythema nodosum occurred occasionally. The criteria for arrest of the disease were fulfilled May 31, 1946, after the patient had received 376.5 gm. of diasone for a period of 18 months.

After arrest of the disease, the patient remained in the hospital and was continued on 1.0 gm. of diasone daily. In December 1947 (18 months after arrest and after an additional 474 gm. of diasone had been administered) at the regular 6-month check-up examination performed on all arrested cases remaining in the hospital, leprosy bacilli (1+) were found in the skin smear from the ear lobes. There were no evidences of infiltration, thickening, nor of other clinical activity. The nasal smear was negative as were skin smears from other areas of the body. Bacilli (1+) continued to be present in the ear lobes despite treatment (488 gm. diasone) until August 1949. No other evidences of activity of the disease were found subsequent to fulfillment of the criteria for arrest nor after reactivation had occurred.

Figure 1 shows the relationship between the average amount and duration of treatment received by the group of patients treated with promin before arrest of the disease was accomplished and that received individually by the relapsed cases in the promin-treated group. Figure 2 shows the same data for the diasone-treated group. The

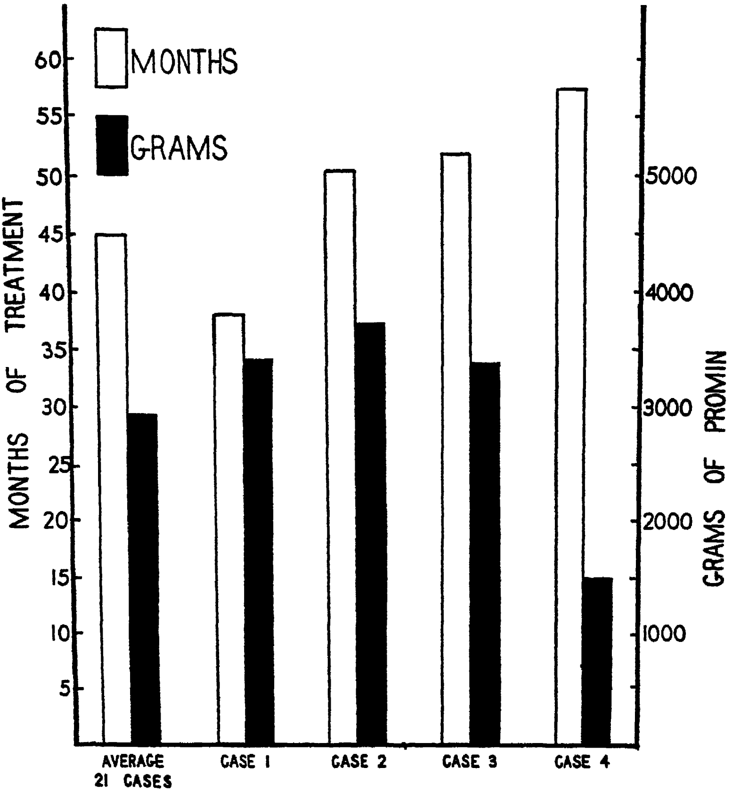

Figure 1. Comparison of the average amount of promin and duration of treatment received by the nonrelapsed promin-treated patients with that received individually by the relapsed promin-treated patients. Black column represents amount of promin received in grams. White column represents duration of treatment in months.

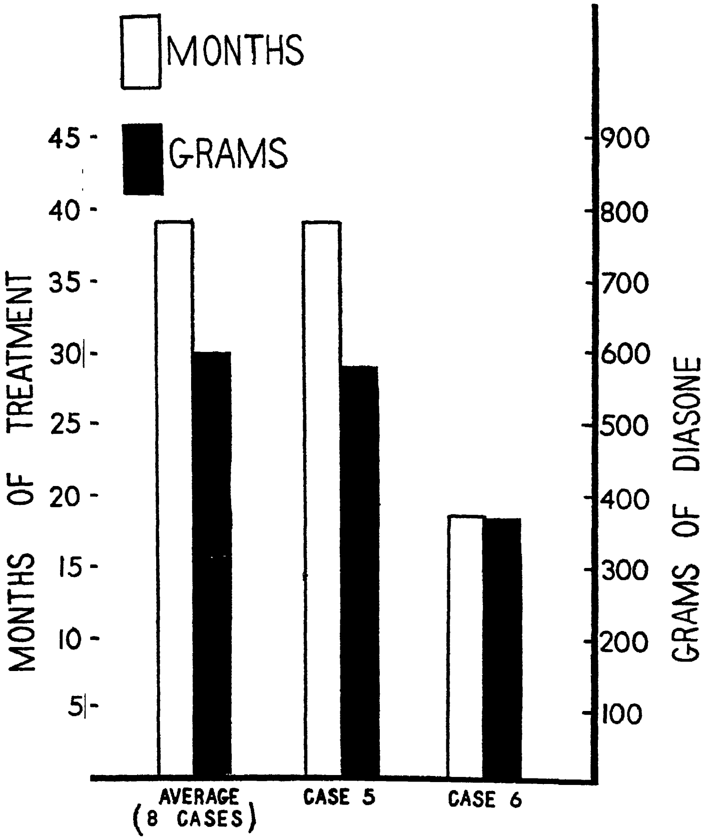

Figure 2. Comparison of the average amount of diasone and duration of treatment received by the nonrelapsed diasone-treated patients with that received individually by the relapsed diasone-treated patients. Black column represents amount of diasone received in grams. White column represents duration of treatment in months.

amount and duration of treatment received by the relapsed cases in both groups compares favorably with the average amount of .treatment received by the nonrelapsed cases in each group except in the instances of cases 4 and 6. It would appear from this analysis that relapse of the disease did not occur from insufficient treatment except possibly in cases 4 and 6. Case 4 received a relatively small amount of promin over a relatively long period of time before arrest of the disease was accomplished. Case 6 received a relatively small amount of diasone over a relatively short period of time.

A most important factor influencing the probability of relapse appeared to be the discontinuation of treatment after apparent arrest of the disease had occurred. Patients who did not receive sulfone therapy following arrest are designated group A and those who received such therapy, group B. Table 2 lists the frequency of relapse as it occurred in these two groups during yearly periods of observation. True clinical relapses, of which there were three, occurred only in group A, the group that received no treatment after arrest. These relapses did not occur until after 2 to 3 years following arrest of the disease. Subclinical relapses occurred in both groups. Two occurred in group A within the first year following arrest and one in group B 18 months following arrest. The latter is case 6 who received a relatively small amount of diasone before fulfillment of the criteria for arrest.

Table 2. *Relapses found in the 33 group A and group B arrested patients observed, by period of follow-up in years*

Period of follow-up (years)	Number arrested patients followed		Number and percent relapsed patients	
	A[1]	B[2]	A[1]	B[2]
½–1	4	4	[3]2	0
1–2	1	3	0	[3]1
2–3	5	3	[4]3	0
3–4	1	10	0	0
4–5	0	2	0	0
Total	11	22	5 (45%)	1 (4.5%)

[1] Patients not receiving sulfones after arrest.
[2] Patients receiving sulfones after arrest.
[3] Subclinical relapse.
[4] Clinical relapse.

Thus, the trend of group A patients indicates that the probability of relapse is markedly increased if sulfone therapy is discontinued after an apparent arrest of the disease. Relapse that has so far occurred among 11 arrested patients (group A) who received no sulfone therapy and were followed from 6 months to 4 years is 45 percent. This percentage of relapse is tenfold greater than that of the 4.5 percent experienced among 22 arrested patients (group B) continued on sulfone therapy and followed from 6 months to 5 years.

Table 2 shows that on an average a larger proportion of group B patients were followed for longer periods of time than were group A patients. Thus, group B patients were afforded a greater opportunity to relapse. Calculating the risk of relapse on a patient-years experience basis as set forth in table 3, however, accentuates even more the divergence of the probability of relapse between the two groups. On this basis, which has greater accuracy for it takes into consideration the time interval, the risk of relapse for group A was 24.4 relapses per 100 patient-years experience, while for group B it was only 1.7 relapses per 100 patient-years experience, or a trend fourteenfold greater for group A to relapse than group B.

Table 3. *Relapses found in 33 group A and group B arrested patients observed on the basis of patient-years experience*

Period of follow-up (years)	Average duration of follow-up (years)	Number patients observed		Number patient-years experience		Number and percent of relapses	
		A	B	A	B	A	B
½–1	0.75	4	4	3	3	2	0
1–2	1.50	1	3	1.5	4.5	0	1
2–3	2.50	5	3	12.5	7.5	3	0
3–4	3.50	1	10	3.5	35.0	0	0
4–5	4.50	0	2	0.0	9.0	0	0
Total		11	22	20.5	59.0	5 (24.4%)	1 (1.7%)

Discussion

The occurrence of relapse following apparent arrest of lepromatous leprosy under treatment with sulfones, undoubtedly, has been anticipated even by the most enthusiastic supporters of sulfone therapy. The fact that relapses have occurred does not brand the sulfones as failures in the therapy of leprosy. In fact, it detracts very little, if any, from the reported value of these drugs in this relentless disease. Their ability to produce regression of leprous lesions and to keep the ravages of the disease in check cannot be discounted.

Since the problem of finding leprosy bacilli in resolving surface lesions becomes a matter of progressively decreasing chance, it is probable that some patients may be declared negative prematurely. From this, it can be argued, that if a negative patient is subsequently found to have a positive skin smear in the absence of clear clinical evidence of reactivation, such a finding is merely a chance interruption of a false negative period rather than a relapse of the disease. In this report the occurrence of a positive skin smear without other manifestations of the disease has been termed a "subclinical relapse" on evidence obtained from case 2. This case showed a positive skin smear 17 months after the disease was considered arrested. Eight months later skin lesions developed and a true clinical relapse occurred. It seems logical to consider the period prior to development of skin lesions and subsequent to the finding of a positive smear as a subclinical relapse of the disease rather than a chance interruption of a false negative period.

The slow disappearance of leprosy bacilli from the skin of most patients under active treatment and the inability to obtain consistent negative skin smears from some, although clinically the response has been excellent, have led to the belief that the sulfones are suppressive or bacteriostatic rather than bacteriocidal in their action. Now that relapses of the disease have been experienced, added support is given to this belief. Temporary partial or complete natural remissions of the disease, undoubtedly, also play a role where the disappearance of clinical lesions and of bacilli from the skin are accelerated beyond expectation. Complete spontaneous remissions or arrests of far advanced nodular lepromatous cases of leprosy, such as those under consideration in this report, however, are rare occurrences.

Case 6 is, perhaps, the most interesting and illustrative of this suppressive action and the role of natural remission. The nodular and infiltrative lesions shown by this patient receded rapidly on diasone therapy. After 18 months of treatment, he fulfilled the criteria for arrest of the disease. Treatment was taken regularly following apparent arrest by the same dosage as during active treatment. After another 18 months of treatment, a 1+ concentration of organisms was recovered from the right ear lobe. There were no visible skin lesions and the nasal smear was negative. After continued regular treatment for another 2 years no skin or mucous membrane lesions developed. The right ear lobe continued to show leprosy bacilli (1+) on monthly examinations. This patient at present has had a total of 5 years' treatment. There has been no clinical evidence of the disease for 4 years and bacteriologic examinations are still positive. It is believed that the sulfones, aided by the forces of natural remission, accounted for the early improvement. The suppressive action of the sulfones has not been of sufficient intensity to prevent the return of organisms, but it has prevented the formation of clinical lesions. The question of "chance interruption" is ruled out by the failure to recover organisms on numerous repeated attempts during a period of 30 months, followed by an easy consistent demonstration of organisms after that period.

The figures given for the probability of relapse are tentative and, in the final analysis, may not be representative of what the true incidence of relapse eventually will be. Since the number of patients followed is small, a great deal of significance cannot be placed on the statistical results obtained. Also, the duration of follow-up has been short in some instances. A factor of selection may have entered into the calculations particularly with reference to the patients representing clinical relapse. Two of these patients had been discharged from the hospital and returned when skin lesions appeared. Since patients who develop visible evidences of the disease are, undoubtedly, more likely to return for examination than those who do not develop them, it may be that the three cases of clinical relapse here reported are the only ones that have developed among all of the patients so far having their disease arrested on the sulfones. Should this be the case the probability of clinical relapse would be much less at the present stage of follow-up than is indicated by this report. Whether or not the probability of relapse after remissions from sulfones will be as great as that (a great majority in from 3 to 5 years) experienced for remissions from chaulmoogra oil remains to be seen.

Tables 2 and 3, although based on small figures, are clear expositions of evidence that relapses are not as likely to occur when sulfone therapy is continued indefinitely. Because of this evidence it is advocated that all cases of lepromatous leprosy following apparent arrest of the disease be continued on sulfone treatment. Also, experience has shown that if treatment is continued, relapses can be prevented even if the dosage of the drug employed is materially reduced. Toxic effects, therefore, need not be especially feared. In the group of patients here reported the dosage was generally reduced to about one-third of that employed during active treatment.

Conclusions and Recommendations

As has been anticipated, relapses may occur following the arrest of lepromatous leprosy after sulfone therapy.

Over a 5-year period in which the follow-up varied from 6 months to 5 years after arrest of lepromatous leprosy on sulfone therapy, relapse rates of 45 percent for patients not continued on sulfones and 4.5 percent for those continued on treatment were experienced. When the probability of relapse was based on patient-years experience, the respective risks of relapse were 24.4 and 1.7 per 100 patient-years experience. Because of obvious selection factors and the limited material available for study, these figures are not claimed to represent true incidences of relapse. They merely indicate a trend.

A comparison of the risk of relapse for the two groups of patients studied strongly indicates that the incidence of relapse can be markedly lowered if sulfone treatment is continued after arrest.

The occurrence of relapse following arrest of the disease when the sulfone drugs are discontinued indicates that the sulfones are suppressive or bacteriostatic, rather than bacteriocidal, in their action. The persistence of leprosy bacilli (1+) in the skin of patients under active treatment for long periods of time without the reappearance of clinically visible lesions gives added evidence to this belief.

Evidence that the incidence of relapse can be effectively lowered by continuation of sulfone therapy in reduced dosage calls for a recommendation that treatment be continued indefinitely in such a manner for arrested cases.

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Reported Incidence of Communicable Diseases in the United States, Second Quarter, 1950

This summary gives provisional figures on cases of communicable diseases reported by the health departments of each State and Alaska, Hawaii, Panama Canal Zone (March and April), Puerto Rico (preliminary), and the Virgin Islands (April) for the second quarter of 1950. The figures are subject to change when final annual figures are released by each State, but in most instances the changes will be small.

Usefulness of these data is limited greatly by wide variations in completeness and accuracy of reporting within and between States and for different diseases. Unconfirmed diagnoses, differing definitions of diseases for reporting purposes, and varying methods of tabulation also contribute to the difficulties of interpretation.

The table gives the numbers of reported cases of selected communicable diseases for each division and State in April, May, and June 1950. Data for diseases reported with low frequencies or by only a few States are given in the section "Additional Diseases."

Infectious Encephalitis

There were 195 cases of infectious encephalitis reported during the second quarter of 1950 compared with 175 cases reported for the corresponding quarter of 1949 and the 5-year (1945–49) median of 115. This is the highest total for any similar quarter during the past 5 years.

Influenza and Pneumonia

Reported cases of influenza for the quarter totaled 43,851 compared with 11,388 cases reported for the corresponding period in 1949. The 5-year median was 18,678. The highest corresponding quarter during the 5-year period was in 1947 when 97,318 cases were reported. The total number of pneumonia cases reported for the second quarter was 23,584, an increase over the 20,438 cases reported for the same quarter in 1949 and the highest total reported since 24,883 cases were reported in 1945. The 5-year median was 20,501.

Poliomyelitis

The incidence of acute poliomyelitis usually starts to increase during the second quarter of the year. For this period, there were fewer cases of acute poliomyelitis (1,745) reported in 1950 than for the same period in 1949 (1,976) and in 1948 (1,790). The 5-year (1945–49) median was 1,339. Cases of acute poliomyelitis reported by month for the United States were: April 278, May 421, and June 1,046. For 1949, the totals were: April 216, May 423, and June 1,337. The percentage distribution of poliomyelitis cases for the second quarter 1950 by type was paralytic 15.4, nonparalytic 7.1, and unspecified 77.5. Monthly returns for the preceding quarter and for last year are now under revision and it is expected that the percentage distribution of paralytic, nonparalytic, and unspecified poliomyelitis cases published in the report for the first quarter 1950 will be changed. Since the monthly morbidity report form (PHS 849 US) was amended to include space for the total number of cases, several States have discontinued reporting this item in the space for paralytic poliomyelitis.

Whooping Cough

Reported cases of whooping cough for the current quarter numbered 36,422, the second highest total for the corresponding period during the past five years. The 5-year median was 28,148. The States reporting the largest total for the quarter were Texas (4,004), California (2,726), Ohio (2,449), and Michigan (2,192).

Other Diseases

The total number of cases of the following selected diseases reported for the quarter was above the 5-year median: anthrax, amebic dysentery, infectious encephalitis, influenza, meningococcal meningitis, poliomyelitis, pneumonia, septic sore throat, trachoma, paratyphoid fever, and whooping cough. Figures for these diseases are given in the table, and in the section "Additional Diseases" following the table.

Reported Cases of Selected Communicable Diseases in the United States, Each Division and State, Second Quarter 1950

[Numbers under diseases are International List numbers, 1948 revision]

Area	Brucellosis (044)	Chickenpox (087)	Conjunctivitis[1] (370)	Diphtheria (055)	Dysentery (045–048) Amebic (046)	Dysentery (045–048) Bacillary (045)	Dysentery (045–048) Unspecified (047, 048)
New England	**19**	**8,804**	**12**	**50**	**6**	**18**	---
Maine	5	814	---	---	---	---	---
New Hampshire	2	199	---	---	---	---	---
Vermont	2	828	---	1	---	---	---
Massachusetts	5	4,992	---	46	3	18	---
Rhode Island	1	288	---	2	---	---	---
Connecticut	4	1,683	12	1	3	---	---
Middle Atlantic	**70**	**23,953**	**2**	**90**	**311**	**81**	---
New York	43	7,785	2	27	297	79	---
New Jersey	10	7,598	---	13	12	2	---
Pennsylvania	17	8,570	---	50	2	---	---
East North Central	**211**	**22,864**	**195**	**120**	**200**	**80**	**1**
Ohio	10	4,784	---	51	4	---	1
Indiana	9	755	19	39	2	1	---
Illinois	124	4,719	22	3	161	31	---
Michigan	17	4,044	154	23	33	48	---
Wisconsin	51	8,562	---	4	---	---	---
West North Central	**174**	**4,774**	**139**	**61**	**16**	**12**	**5**
Minnesota	68	468	1	17	12	11	---
Iowa	27	944	63	5	---	---	---
Missouri	16	708	8	11	2	---	5
North Dakota	17	105	6	2	---	---	---
South Dakota	11	166	---	5	([2])	([2])	([2])
Nebraska	4	664	---	2	---	---	---
Kansas	31	1,719	61	19	2	1	---
South Atlantic	**81**	**5,360**	**150**	**199**	**86**	**121**	**647**
Delaware	---	61	---	---	---	---	---
Maryland	9	1,408	---	16	1	5	---
District of Columbia	1	239	---	---	2	3	---
Virginia	18	1,139	---	25	4	---	640
West Virginia	---	493	112	25	6	4	---
North Carolina	1	---	---	49	22	5	---
South Carolina	5	---	---	34	1	8	---
Georgia	38	1,084	25	27	18	75	7
Florida	9	936	13	23	32	21	---
East South Central	**50**	**2,072**	**14**	**158**	**79**	**55**	**2**
Kentucky	7	374	11	27	22	30	---
Tennessee	5	630	3	49	22	3	2
Alabama	12	1,068	---	42	19	([2])	([2])
Mississippi	26	---	---	40	16	22	---
West South Central	**148**	**1,174**	---	**234**	**303**	**4,127**	**1,570**
Arkansas	11	376	---	17	48	24	68
Louisiana	10	178	---	23	115	1	---
Oklahoma	27	620	---	10	8	3	11
Texas	100	---	---	184	132	4,099	1,491
Mountain	**45**	**4,127**	**159**	**37**	**84**	**372**	**35**
Montana	3	185	40	7	1	---	1
Idaho	8	330	74	2	1	---	13
Wyoming	---	112	7	---	1	---	---
Colorado	21	935	---	14	4	---	---
New Mexico	---	147	18	5	2	6	---
Arizona	7	889	---	6	68	366	14
Utah	6	1,397	---	3	7	---	---
Nevada	---	132	20	---	---	---	7
Pacific	**37**	**12,555**	**31**	**80**	**109**	**96**	**61**
Washington	11	---	---	5	13	8	6
Oregon	3	---	31	1	28	2	55
California	23	12,555	---	74	68	86	([2])
Second quarter 1950	835	85,683	702	1,029	1,194	4,962	2,321
Second quarter 1949	1,335	119,531	660	1,465	1,479	8,202	3,098
Median 1945–49	1,359	110,965	452	2,353	1,067	8,148	2,079
Alaska	1	213	---	1	---	---	---
Hawaii	2	544	34	2	1	20	---
Panama Canal Zone[3]	---	140	---	2	5	28	---
Puerto Rico[4]	---	408	---	51	---	---	7
Virgin Islands[5]	---	1	---	---	---	---	---

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[1] For reported cases of "Ophthalmia neonatorum" see the section following table. [2] Reported not notifiable. [3] March and April only. [4] From weekly reports, April and May only. [5] April only.

Reported Cases of Selected Communicable Diseases in the United States, Each Division and State, Second Quarter 1950—Continued

[Numbers under diseases are International List numbers, 1948 revision]

Area	Encephalitis, acute infectious (082)	German measles (086)	Hookworm disease (129)	Influenza (480–483)	Malaria (110–117)	Measles (085)	Meningitis, meningococcal (057.0)
New England	**12**	**4,146**	--------	**444**	**1**	**12,405**	**32**
Maine	--------	1,732	--------	349	--------	415	5
New Hampshire	--------	255	--------	26	--------	380	1
Vermont	--------	203	--------	15	--------	92	1
Massachusetts	12	1,215	--------	(1)	--------	8,397	13
Rhode Island	--------	20	--------	8	--------	159	4
Connecticut	--------	721	--------	46	1	2,962	8
Middle Atlantic	**56**	**7,094**	**57**	**150**	**7**	**47,893**	**128**
New York	36	1,970	57	[2] 41	2	19,331	34
New Jersey	17	3,955	--------	39	5	18,227	27
Pennsylvania	3	1,169	--------	70	--------	10,335	67
East North Central	**45**	**7,296**	**7**	**1,386**	**11**	**52,104**	**226**
Ohio	--------	1,046	--------	69	1	7,617	74
Indiana	8	180	--------	43	--------	5,144	17
Illinois	14	1,000	--------	77	8	13,339	60
Michigan	22	4,550	7	79	--------	15,999	42
Wisconsin	1	520	--------	1,118	2	10,005	33
West North Central	**14**	**111**	**1**	**912**	**2**	**11,230**	**90**
Minnesota	3	--------	--------	97	--------	2,549	18
Iowa	--------	--------	--------	--------	1	4,586	10
Missouri	1	84	--------	225	1	826	39
North Dakota	2	--------	--------	212	--------	65	5
South Dakota	5	--------	1	11	--------	394	4
Nebraska	1	--------	--------	232	--------	2,069	2
Kansas	2	27	--------	135	--------	741	12
South Atlantic	**11**	**215**	**2 891**	**17,229**	**61**	**12,250**	**171**
Delaware	1	--------	--------	3	--------	136	7
Maryland	1	86	--------	243	1	909	28
District of Columbia	--------	--------	--------	15	--------	720	3
Virginia	--------	--------	--------	12,670	2	1,611	34
West Virginia	1	104	--------	2,542	1	3,136	21
North Carolina	--------	--------	--------	--------	16	2,068	31
South Carolina	1	--------	--------	804	32	826	11
Georgia	6	--------	--------	864	8	1,037	23
Florida	1	25	2,891	88	1	1,807	13
East South Central	**13**	**473**	**663**	**5,424**	**61**	**6,894**	**112**
Kentucky	1	148	--------	1,183	1	3,164	35
Tennessee	8	295	6	1,310	5	2,004	35
Alabama	--------	30	--------	2,491	28	935	29
Mississippi	4	--------	657	440	27	791	13
West South Cantral	**20**	**103**	**252**	**14,338**	**542**	**10,419**	**142**
Arkansas	1	55	--------	5,848	16	1,006	18
Louisiana	1	4	240	57	2	237	22
Oklahoma	3	44	12	2,697	16	228	16
Texas	15	--------	--------	5,736	508	8,948	86
Mountain	**7**	**765**	--------	**3,336**	**6**	**9,033**	**14**
Montana	--------	67	--------	658	--------	802	1
Idaho	1	183	--------	816	--------	916	1
Wyoming	--------	72	--------	4	3	334	1
Colorado	2	83	--------	235	--------	2,139	8
New Mexico	--------	98	--------	18	--------	347	--------
Arizona	3	122	--------	1,417	3	845	1
Utah	1	140	--------	66	--------	3,526	2
Nevada	--------	--------	--------	122	--------	124	--------
Pacific	**17**	**955**	**1**	**632**	**3**	**10,198**	**83**
Washington	--------	--------	--------	225	--------	1,362	22
Oregon	--------	--------	1	296	1	165	8
California	17	955	--------	111	2	8,671	53
Second quarter 1950	195	21,158	3,872	43,851	694	172,426	998
Second quarter 1949	175	55,863	4,547	11,388	1,324	298,745	898
Median 1945–49	115	13,623	4,530	18,678	4,536	298,745	984
Alaska	--------	16	--------	261	--------	105	--------
Hawaii	--------	21	--------	33	--------	20	1
Panama Canal Zone [3]	--------	--------	--------	--------	114	402	1
Puerto Rico [4]	--------	--------	--------	104	20	92	--------
Virgin Islands [5]	--------	--------	--------	--------	--------	--------	--------

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[1] Reported not notifiable. [2] New York City only. [3] March and April only. [4] From weekly reports, April and May only. [5] April only.

Reported Cases of Selected Communicable Diseases in the United States, Each Division and State, Second Quarter 1950—Continued

[Numbers under diseases are International List numbers, 1948 revision]

Area	Mumps	Pneumonia	Poliomyelitis				Rheumatic fever
			Total	Paralytic	Nonparalytic	Unspecified	
	(089)	(490–493)	(080.0–080.3)	(080.0–080.1)	(080.2)	(080.3)	(400–402)
New England	**7,209**	**872**	**18**	**7**	**3**	**8**	**25**
Maine	1,083	237	1	1	---	---	1
New Hampshire	253	---	1	---	---	1	---
Vermont	1,220	11	1	---	---	1	---
Massachusetts	2,727	(1)	6	3	2	1	(1)
Rhode Island	172	85	1	---	---	1	24
Connecticut	1,754	539	8	3	1	4	(1)
Middle Atlantic	**19,805**	**5,026**	**144**	---	---	**144**	**184**
New York	5,907	3,186	84	---	---	84	(1)
New Jersey	3,868	697	42	---	---	42	(1)
Pennsylvania	10,030	1,143	18	---	---	18	184
East North Central	**15,279**	**3,076**	**146**	**37**	**32**	**77**	**273**
Ohio	3,876	904	27	---	---	27	35
Indiana	331	167	10	---	1	9	1
Illinois	3,195	1,229	37	20	13	4	71
Michigan	3.447	654	42	17	18	7	165
Wisconsin	4,430	122	30	---	---	30	1
West North Central	**4,629**	**1,335**	**134**	**11**	**2**	**121**	**39**
Minnesota	5	160	13	4	2	7	35
Iowa	1,268	25	40	---	---	40	1
Missouri	498	256	31	---	---	31	---
North Dakota	8	653	---	---	---	---	---
South Dakota	143	5	4	---	---	4	(1)
Nebraska	510	59	30	---	---	30	---
Kansas	2,167	177	16	7	---	9	2
South Atlantic	**3,929**	**3,316**	**154**	**13**	**7**	**134**	**92**
Delaware	43	10	2	---	---	2	1
Maryland	794	492	4	3	1	---	14
District of Columbia	120	379	6	3	3	---	---
Virginia	1,394	959	9	---	---	9	50
West Virginia	568	190	17	---	---	17	8
North Carolina	---	---	27	---	---	27	---
South Carolina	---	120	33	---	---	33	3
Georgia	479	1,000	10	6	2	2	16
Florida	531	166	46	1	1	44	(1)
East South Central	**1,665**	**2,196**	**120**	**40**	**3**	**77**	**98**
Kentucky	441	364	34	26	3	5	9
Tennessee	623	703	14	14	(1)	(1)	21
Alabama	601	708	23	---	---	23	56
Mississippi	---	421	49	---	---	49	12
West South Central	**2,052**	**5,970**	**691**	**42**	**23**	**626**	**26**
Arkansas	823	418	32	8	11	13	2
Louisiana	123	409	41	32	9	---	14
Oklahoma	1,106	444	55	2	3	50	10
Texas	---	4,699	563	---	---	563	(1)
Mountain	**3,507**	**884**	**80**	**19**	**6**	**55**	**119**
Montana	60	7	---	---	---	---	1
Idaho	170	86	14	---	---	14	17
Wyoming	80	19	8	2	4	2	19
Colorado	886	272	16	11	2	3	26
New Mexico	248	171	9	6	---	3	14
Arizona	1,058	264	26	---	---	26	36
Utah	936	49	4	---	---	4	6
Nevada	69	16	3	---	---	3	---
Pacific	**13,749**	**909**	**258**	**99**	**48**	**111**	**211**
Washington	---	152	4	---	---	4	69
Oregon	---	319	22	13	6	3	16
California	13,749	438	232	86	42	104	126
Second quarter 1950	71,824	23,584	1,745	268	124	1,353	1,067
Second quarter 1949	80,004	20,438	1,976	(2)	(2)	(2)	1,487
Median 1945–49	76,337	20,501	1,339	(2)	(2)	(2)	1,410
Alaska	144	26	---	---	---	---	7
Hawaii	46	4	6	6	---	---	7
Panama Canal Zone [3]	152	[4] 31	---	---	---	---	---
Puerto Rico [5]	---	---	7	---	---	7	---
Virgin Islands [6]	---	---	---	---	---	---	---

[1] Reported not notifiable. [2] Not available. [3] March and April only. [4] For canal Zone only. [5] From weekly reports, April and May only. [6] April only.

Reported Cases of Selected Communicable Diseases in the United States, Each Division and State, Second Quarter 1950—Continued

[Numbers under diseases are International List numbers, 1948 revision]

Area	Rocky Mountain spotted fever (104)	Scarlet fever (050)	Septic sore throat (051)	Smallpox (084)	Tetanus (061)	Trachoma (095)	Trichiniasis (128)
New England	----------	**2,324**	**135**	----------	**3**	----------	**14**
Maine	----------	85	4	----------	----------	----------	3
New Hampshire	----------	[1] 69	(1)	----------	1	----------	----------
Vermont	----------	18	1	----------	----------	----------	----------
Massachusetts	----------	1,747	30	----------	2	----------	4
Rhode Island	----------	65	4	----------	----------	----------	----------
Connecticut	----------	340	96	----------	----------	----------	7
Middle Atlantic	**8**	**3,568**	**29**	----------	**5**	**1**	**42**
New York	2	[1] 1,761	(1)	----------	3	[2] 1	35
New Jersey	4	465	29	----------	1	----------	6
Pennsylvania	2	1,342	----------	----------	1	----------	1
East North Central	**7**	**4,604**	**245**	----------	**14**	**7**	**12**
Ohio	----------	1,679	5	----------	3	----------	9
Indiana	4	485	1	----------	3	----------	----------
Illinois	2	516	31	----------	5	2	1
Michigan	1	1,359	146	----------	3	----------	2
Wisconsin	----------	565	62	----------	----------	5	----------
West North Central	**1**	**828**	**47**	**5**	**4**	**346**	**3**
Minnesota	----------	183	38	----------	2	6	2
Iowa	----------	52	----------	2	1	----------	----------
Missouri	----------	178	8	1	1	182	----------
North Dakota	----------	37	----------	----------	----------	16	----------
South Dakota	----------	31	----------	----------	----------	120	----------
Nebraska	1	[1] 189	(1)	1	----------	22	1
Kansas	----------	158	1	1	----------	----------	----------
South Atlantic	**73**	**850**	**707**	----------	**26**	**2**	**1**
Delaware	1	33	----------	----------	----------	----------	----------
Maryland	24	220	13	----------	5	1	----------
District of Columbia	1	48	----------	----------	----------	----------	1
Virginia	17	190	546	----------	----------	----------	----------
West Virginia	8	72	61	----------	----------	----------	----------
North Carolina	15	155	9	----------	----------	----------	----------
South Carolina	4	32	10	----------	----------	----------	----------
Georgia	3	64	42	----------	8	----------	----------
Florida	----------	36	26	----------	13	1	(3)
East South Central	**19**	**513**	**59**	**1**	**30**	**10**	----------
Kentucky	4	161	34	----------	2	8	----------
Tennessee	10	216	25	----------	10	2	----------
Alabama	3	96	(3)	----------	14	----------	(3)
Mississippi	2	40	(3)	1	4	----------	(3)
West South Central	**6**	**524**	**2,394**	**4**	**15**	**54**	**1**
Arkansas	1	36	329	----------	8	18	----------
Louisiana	2	48	10	----------	3	----------	1
Oklahoma	3	111	136	4	4	14	----------
Texas	----------	329	1,919	----------	(3)	22	(3)
Mountain	**29**	**541**	**896**	**4**	**3**	**85**	**4**
Montana	8	122	29	----------	1	----------	----------
Idaho	4	45	65	----------	----------	----------	4
Wyoming	1	15	1	----------	----------	7	----------
Colorado	11	131	63	1	----------	----------	----------
New Mexico	1	35	----------	1	1	12	----------
Arizona	----------	155	640	----------	1	65	----------
Utah	3	31	1	----------	----------	----------	----------
Nevada	1	7	97	2	----------	1	----------
Pacific	**11**	**1,812**	**298**	----------	**9**	**11**	**6**
Washington	----------	328	12	----------	----------	----------	----------
Oregon	9	132	95	----------	----------	----------	----------
California	2	1,352	191	----------	9	11	6
Second quarter 1950	154	15,564	4,810	14	109	516	83
Second quarter 1949	207	19,748	5,410	27	128	533	91
Median 1945–49	176	22,993	3,532	73	113	352	91
Alaska	----------	13	21	----------	----------	----------	----------
Hawaii	----------	3	2	----------	1	----------	----------
Panama Canal Zone [4]	----------	----------	----------	----------	2	----------	----------
Puerto Rico [5]	----------	----------	----------	----------	27	----------	----------
Virgin Islands [6]	----------	----------	----------	----------	----------	----------	----------

[1] Cases reported as septic sore throat included with scarlet fever. [2] New York City only. [3] Reported not notifiable. [4] March and April only. [5] From weekly reports, April and May only. [6] April only.

Reported Cases of Selected Communicable Diseases in the United States, Each Division and State, Second Quarter 1950—Continued

[Numbers under diseases are International List numbers, 1948 revision

Area	Tuberculosis		Tularemia	Typhoid fever	Paratyphoid fever [2]	Typhus fever, endemic	Whooping cough
	All forms (001-019)	Respiratory (001-008)	(059)	(040)	(041)	(101)	(056)
New England	**1,311**	**1,193**	---	**11**	**20**	---	**4,569**
Maine	123	116	---	---	---	---	461
New Hampshire	46	---	---	---	---	---	95
Vermont	62	62	---	---	---	---	311
Massachusetts	616	574	---	3	20	---	1,701
Rhode Island	108	98	---	2	---	---	722
Connecticut	356	343	---	6	---	---	1,279
Middle Atlantic	**5,663**	**3,128**	**2**	**52**	**35**	---	**4,945**
New York	3,418	3,128	---	22	20	---	1,646
New Jersey	832	---	---	6	4	---	1,560
Pennsylvania	1,413	---	2	24	11	---	1,739
East North Central	**4,220**	**2,545**	**15**	**49**	**38**	---	**7,554**
Ohio	(1)	(1)	---	13	3	---	2,449
Indiana	727	668	3	6	---	---	501
Illinois	2,017	1,877	11	12	1	---	951
Michigan	1,203	---	1	12	32	---	2,192
Wisconsin	273	---	---	6	2	---	1,461
West North Central	**2,323**	**171**	**11**	**37**	**6**	---	**1,921**
Minnesota	665	---	---	3	6	---	512
Iowa	222	---	---	1	---	---	297
Missouri	1,073	---	10	25	---	---	477
North Dakota	79	57	---	1	---	---	60
South Dakota	62	---	---	---	---	---	64
Nebraska	99	---	---	3	---	---	58
Kansas	123	114	1	4	---	---	453
South Atlantic	**5,096**	**4,263**	**33**	**94**	**26**	**51**	**4,236**
Delaware	68	68	---	2	---	---	97
Maryland	763	731	2	12	2	---	646
District of Columbia	---	---	---	1	1	---	32
Virginia	977	962	2	5	4	---	1,100
West Virginia	598	593	---	20	1	---	780
North Carolina	1,117	1,080	4	18	3	2	1,025
South Carolina	---	---	2	17	---	4	167
Georgia	849	829	20	14	8	33	270
Florida	724	---	3	5	7	12	119
East South Central	**3,296**	**1,390**	**25**	**55**	**15**	**42**	**2,088**
Kentucky	1,074	1,042	2	21	1	---	990
Tennessee	1,146	---	3	13	8	---	599
Alabama	712	---	5	8	5	40	417
Mississippi	364	348	15	13	1	2	82
West South Central	**2,686**	**1,424**	**130**	**137**	**18**	**79**	**5,163**
Arkansas	450	440	69	19	1	---	822
Louisiana	504	480	5	28	3	6	42
Oklahoma	510	504	17	12	6	---	295
Texas	1,222	(1)	39	78	8	73	4,004
Mountain	**1,698**	**1,152**	**27**	**13**	**6**	---	**1,955**
Montana	131	115	13	1	---	---	131
Idaho	48	---	1	2	---	---	311
Wyoming	41	40	3	1	---	---	24
Colorado	388	---	---	3	---	---	320
New Mexico	249	236	---	1	3	---	287
Arizona	648	618	2	4	3	---	568
Utah	153	143	8	1	---	---	234
Nevada	40	---	---	---	---	---	80
Pacific	**3,060**	**2,404**	**1**	**32**	**206**	---	**3,991**
Washington	494	---	---	9	7	---	721
Oregon	203	187	---	4	4	---	544
California	2,363	2,217	1	19	195	---	2,726
Second quarter 1950	29,353	17,670	244	480	370	172	36,422
Second quarter 1949	31,311	18,951	290	568	260	229	14,423
Median 1945–49	31,311	18,951	285	725	207	409	28,148
Alaska	---	---	---	13	---	---	32
Hawaii	113	---	---	---	---	5	8
Panama Canal Zone [3]	[4] 8	---	---	7	---	1	33
Puerto Rico [5]	865	---	---	11	---	4	554
Virgin Islands [6]	3	---	---	---	---	---	---

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[1] Reported not notifiable.
[2] Includes salmonellosis.
[3] March and April only.
[4] Canal Zone only.
[5] From weekly reports, April and May only.
[6] April only.

Additional Diseases

Figures for additional diseases reported by State health departments in the second quarter of 1950 and not shown in the table are given below. Also included are diseases reported by Territories and possessions. Figures for the Panama Canal Zone are for March and April; Puerto Rico (from weekly reports) for April and May; and Virgin Islands for April. The numbers in parentheses are from the Manual of the International Statistical Classification of Diseases, Injuries, and Causes of Death, World Health Organization, 1948.

Actinomycosis (132): Ohio 1.

Anthrax (062): Colorado 1, Connecticut 1, Georgia 1, Massachusetts 2, New Hampshire 2, New Jersey 4, New York 1, Pennsylvania 6.

Botulism (049.1): Colorado 3, Minnesota 2.

Cancer (140–205): Alabama 1,154, Arkansas 142, Colorado 766, Florida 1,506, Georgia 90, Idaho 313, Kansas 978, Kentucky 4, Louisiana 758, Montana 394, Nevada 12, New Mexico 216, North Dakota 171, Pennsylvania 2,261, South Carolina 76, Tennessee 826, Utah 105, Wyoming 112, Alaska 5, Virgin Islands 1.

Coccidioidomycosis (133): Arizona 36, California 29, Oklahoma 1.

Colorado tick fever (096.9): Colorado 78, Oregon 3.

Dengue (090): Georgia 1, Texas 12, Virginia 3.

Diarrhea of the newborn (764): California 36, Connecticut 1, Florida 28, Illinois 22, Kansas 1, Minnesota 1, New Mexico 2, New York 1, Ohio 15, Oklahoma 1, Pennsylvania 1, West Virginia 4, South Carolina 31, Washington 1.

Diarrhea, unspecified (571): Florida 6, Kentucky 19, Maryland 13, Michigan 26, Minnesota 10, New Mexico 11, New York 27, Ohio 155 including enteritis, South Carolina 3, Texas 326, Alaska 48.

Encephalitis, myelitis, and encephalomyelitis, except acute infections (343): Colorado 2, Maryland 4, North Carolina 4, Ohio 15, Washington 3.

Erysipelas (052): Arkansas 2, Connecticut 7, Florida 3, Idaho 2, Illinois 50, Indiana 1, Kansas 4, Maryland 1, Michigan 34, Minnesota 1, Missouri 3, Montana 1, Nebraska 1, North Dakota 3, Ohio 12, Oregon 10, Pennsylvania 17, Tennessee 10, Wisconsin 14, Wyoming 2.

Favus (131 part): Missouri 2.

Food poisoning (049.2): California 217, Connecticut 14, Florida 18, Idaho 27, Illinois 67, Indiana 12, Kansas 1, Kentucky 104, Louisiana 5, Minnesota 43, Nevada 11, New Mexico 10, New York 166, Ohio 12, Oklahoma 5, Oregon 6, Pennsylvania 178, Washington 8, Panama Canal Zone 3.

Glandular fever (infectious mononucleosis) (093): Arizona 3, Connecticut 60, Idaho 5, Kentucky 14, Maryland 4, Michigan 38, Minnesota 99, Ohio 1, Oklahoma 1, Tennessee 16, Washington 6.

Hepatitis, infectious (092): California 104, Connecticut 3, Florida 2, Illinois 9, Indiana 6, Maine 1, Maryland 22, Michigan 6, Minnesota 1, Montana 3, Nevada 2, New York 138, Oklahoma 1, Oregon 45, Pennsylvania 145, Tennessee 21, Washington 86, West Virginia 1, Hawaii 1, Panama Canal Zone 2.

Impetigo (695,766): Colorado 6, Connecticut 7, Idaho 11, Illinois 1, Indiana 3, Kansas 2, Kentucky 4, Michigan 257, Missouri 1, Montana 4, Nevada 29, New York 38, North Dakota 2, Ohio 40, Wyoming 1.

Leprosy (060): California 1, Florida 2, Illinois 1, Louisiana 1, Texas 8, Hawaii 10, Panama Canal Zone 3.

Meningitis, except meningococcal and tuberculous (340): Colorado 3, Illinois 79, Indiana 14, Kentucky 11, Maryland 6, Massachusetts 62, Michigan 10, Minnesota 13, Mississippi 21, Missouri 2, Montana 2, New Mexico 8, New York 91, North Dakota 5, Ohio 37, Rhode Island 16, Utah 3, Washington 13, West Virginia 1, Wyoming 1.

Ophthalmia neonatorum (033, 765) (for reported cases of "Conjunctivitis" see table): Arizona 1, California 2, Connecticut 1, Florida 7, Illinois 31, Louisiana 1, Maryland 1, Massachusetts 38, Michigan 3, Mississippi 10, New Mexico 1, New York 6, Ohio 162, Pennsylvania 1, Tennessee 2, Texas 30, Wisconsin 1.

Pellagra (281): Alabama 5, Arizona 2, Arkansas 7, Georgia 16, Oklahoma 4, Tennessee 7, Virginia 2, Virgin Islands 1.

Plague (050): United States, 0.

Psittacosis (096.2): California, 4, Indiana 1, Michigan 4.

Rabies (094): Arkansas 1, Indiana 1, Tennessee 1.

Relapsing fever (071): Nevada 3, Texas 2.

Rickettsialpox (108): New York City 26.

Ringworm of the scalp (131, part): Arkansas 1, Connecticut 24, Florida 2, Georgia 8, Illinois 343, Indiana 24, Iowa 4, Kansas 21, Kentucky 20, Minnesota 2, Missouri 4, Montana 1, Nevada 9, Ohio 63, Oklahoma 9, Oregon 34, South Carolina 56, Utah 10, Virginia 38, Washington 159.

Scabies (135): Idaho 12, Indiana 2, Kansas 2, Kentucky 38, Maryland 1, Michigan 163, Montana 1, Nevada 8, North Dakota 1, Ohio 22, Pennsylvania 43.

Schistosomiasis (123): New York 23.

Vincent's infection (070): Colorado 56, Florida 32, Georgia 4, Idaho 2, Illinois 21, Indiana 3, Kansas 10, Kentucky 3, Maryland 6, Nevada 17, New Hampshire 3, Ohio 5, Oklahoma 26, South Dakota 2, Tennessee 13, Wyoming 1.

Weil's disease (072): California 1, Michigan 4, New York 1, Ohio 2, Pennsylvania 1, Tennessee 1.

Rabies in animals: Alabama 117, Arizona 4, Arkansas 41, California 37, Colorado 32, Florida 5, Georgia 120, Illinois 35, Indiana 184, Iowa 140, Kansas 24, Kentucky 171, Louisiana 3, Michigan 62, Minnesota 1, New York 256, Ohio 89, Oklahoma 44, Pennsylvania 23, South Carolina 77, Tennessee 66, Texas 271, Virginia 47, West Virginia 83, Wisconsin 5.

Incidence of Disease

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

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UNITED STATES

Reports From States for Week Ended August 19, 1950

For the current week, new cases of acute poliomyelitis reported in the Nation numbered 1,489, a 3 percent increase over the 1,442 cases reported last week. This is the lowest percentage increase over the preceding week since the week ended May 27, the beginning of the upward weekly trend in reported cases of poliomyelitis. The total for the current week is less than the 3,416 cases reported for the corresponding week in 1949.

The cumulative total (9,097) for the current "disease" year was below the corresponding total (16,375) for last year, the highest on record. The "disease" year for acute poliomyelitis begins with the twelfth week of the calendar year.

The cumulative total for the calendar year was 10,231, compared with the total of 17,290 for the corresponding period last year.

Comparative Data for Cases of Specified Reportable Diseases: United States

[Numbers after diseases are International List numbers, 1948 revision]

Disease	Total for week ended—		5-year median 1945-49	Seasonal low week	Cumulative total since seasonal low week—		5-year median 1944-45 through 1948-49	Cumulative total for calendar year—		5-year median 1945-49
	Aug. 19, 1950	Aug. 20, 1949			1949-50	1948-49		1950	1949	
Anthrax (062)	------	------	(1)	(1)	(1)	(1)	(1)	29	38	(1)
Diphtheria (055)	65	104	128	27th	387	568	791	3,515	4,336	7,088
Acute infectious encephalitis (082)	21	14	19	(1)	(1)	(1)	(1)	516	379	328
Influenza (480-483)	781	627	605	30th	2,349	1,673	1,673	248,608	77,540	140,912
Measles (085)	979	854	854	35th	305,774	639,727	584,297	286,644	587,334	549,351
Meningococcal meningitis (057.0)	58	44	55	37th	3,555	3,186	3,454	2,642	2,342	2,482
Pneumonia (490-493)	708	781	-------	(1)	(1)	(1)	--------	60,689	55,724	-------
Acute poliomyelitis (080)	1,489	3,416	1,313	11th	[2] 9,097	16,375	8,374	[2] 10,231	17,290	8,841
Rocky Mountain spotted fever (104)	26	28	27	(1)	(1)	(1)	(1)	348	441	410
Scarlet fever (050)	239	218	377	32d	239	218	377	40,409	57,884	62,480
Smallpox (084)	1	1	1	35th	45	51	199	25	41	145
Tularemia (059)	11	18	18	(1)	(1)	(1)	(1)	642	799	672
Typhoid and paratyphoid fever [3] (040, 041)	102	135	131	11th	1,604	1,948	1,948	2,114	2,436	2,436
Whooping cough (056)	2,353	1,478	2,045	39th	107,941	48,221	90,561	86,405	38,188	64,543

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[1] Not computed. [2] Deduction: Georgia, week ended August 12, 2 cases. [3] Including cases reported as salmonellosis.

For the current week, total reported incidence of poliomyelitis in 5 of the 9 geographic divisions decreased over the preceding week. These decreases ranged from 45 (215 to 170) cases reported in the West South Central States to 9 (126 to 117) cases in the Pacific States. The 4 divisions increasing over the preceding week ranged from 118 cases (202 to 320) in the East North Central States to 4 (23 to 27) in the Mountain States.

For the current week, the States reporting the largest numbers of cases were: New York (191), Texas (113), Illinois (104), Ohio and Michigan (83 each), Pennsylvania (69), Virginia (68), and California (63).

The total number of cases of infectious encephalitis reported for the week was 21, compared with 14 reported for the corresponding period last year. For the calendar year, a total of 516 cases was reported, the highest total in the past 5 years.

The reported incidence of whooping cough was 2,353 cases for the current week compared with 1,478 reported for the corresponding week last year. The 5-year median was 2,045. The cumulative total for the calendar year was 86,405 cases, the next highest number during the past 5 years.

Of 41 States and the District of Columbia reporting on rabies in animals, 24 States and the District of Columbia reported no cases. The remaining 17 States reported 80 cases. States reporting the largest numbers were: New York (23), and Texas (14).

One case of smallpox was reported in Kansas. The New Mexico State Health Department confirmed by laboratory test, the positive report for bubonic plague from a 14-year-old girl, presumably an Arizona patient. The case report has not yet been received.

Deaths During Week Ended August 19, 1950

	Week ended Aug. 19, 1950	*Corresponding week, 1949*
Data for 94 large cities of the United States:		
Total deaths	8, 242	8, 529
Median for 3 prior years	8, 385	----------
Total deaths, first 33 weeks of year	307, 192	307, 814
Deaths under 1 year of age	635	725
Median for 3 prior years	686	----------
Deaths under 1 year of age, first 33 weeks of year	20, 502	21, 635
Data from industrial insurance companies:		
Policies in force	69, 656, 418	70, 242, 785
Number of death claims	10, 794	11, 877
Death claims per 1,000 policies in force, annual rate	8. 1	8. 8
Death claims per 1,000 policies, first 33 weeks of year, annual rate	9. 5	9. 4

Reported Cases of Selective Communicable Diseases: United States, Week Ended August 19. 1950

[Numbers under diseases are International List numbers, 1948 revision]

Area	Diphtheria (055)	Encephalitis, infectious (082)	Influenza (480-483)	Measles (085)	Meningitis, meningococcal (057.0)	Pneumonia (490-493)	Poliomyelitis (080)
United States	**65**	**21**	**781**	**979**	**58**	**708**	**1,489**
New England	**5**	---------	---------	**71**	**2**	**23**	**36**
Maine	5	---------	---------	4	2	4	3
New Hampshire	---------	---------	---------	---------	---------	---------	---------
Vermont	---------	---------	---------	1	---------	---------	2
Massachusetts	---------	---------	---------	58	---------	---------	17
Rhode Island	---------	---------	---------	---------	---------	3	2
Connecticut	---------	---------	---------	8	---------	16	12
Middle Atlantic	**6**	**4**	---------	**251**	**14**	**163**	**302**
New York	3	1	[1]	100	6	97	191
New Jersey	2	3	---------	83	1	34	42
Pennsylvania	1	---------	---------	68	7	32	69
East North Central	**2**	**3**	**4**	**304**	**8**	**101**	**320**
Ohio	---------	---------	---------	69	3	---------	83
Indiana	2	---------	---------	2	---------	7	29
Illinois	---------	---------	---------	58	3	69	104
Michigan	---------	1	---------	58	1	22	83
Wisconsin	---------	2	4	117	1	3	21
West North Central	**1**	---------	**5**	**34**	**3**	**37**	**154**
Minnesota	---------	---------	2	7	---------	14	22
Iowa	---------	---------	---------	2	1	---------	46
Missouri	---------	---------	3	16	1	7	32
North Dakota	---------	---------	---------	4	---------	11	5
South Dakota	---------	---------	---------	1	1	---------	11
Nebraska	---------	---------	---------	1	---------	---------	20
Kansas	1	---------	---------	3	---------	5	18
South Atlantic	**25**	**2**	**215**	**53**	**11**	**82**	**243**
Delaware	---------	---------	---------	2	---------	---------	3
Maryland	1	---------	1	2	1	15	27
District of Columbia	---------	---------	1	---------	2	6	10
Virginia	---------	---------	189	23	3	33	68
West Virginia	5	1	4	5	1	1	17
North Carolina	11	---------	---------	3	2	---------	59
South Carolina	5	1	17	3	1	7	21
Georgia	2	---------	2	9	---------	10	19
Florida	1	---------	1	6	1	10	19
East South Central	**11**	---------	**17**	**6**	**5**	**49**	**120**
Kentucky	1	---------	---------	2	1	1	42
Tennessee	2	---------	6	2	4	---------	36
Alabama	4	---------	8	1	---------	31	27
Mississippi	4	---------	3	1	---------	17	15
West South Central	**10**	**1**	**479**	**70**	**11**	**172**	**170**
Arkansas	---------	---------	20	5	---------	16	17
Louisiana	3	---------	---------	3	---------	8	17
Oklahoma	1	---------	15	2	---------	2	23
Texas	6	1	444	60	11	146	113
Mountain	**2**	**1**	**57**	**86**	**1**	**37**	**27**
Montana	---------	---------	11	4	---------	1	1
Idaho	---------	---------	1	2	---------	---------	2
Wyoming	---------	---------	---------	5	---------	3	4
Colorado	1	1	3	52	---------	8	13
New Mexico	---------	---------	---------	3	---------	19	2
Arizona	1	---------	40	13	1	5	1
Utah	---------	---------	2	7	---------	1	4
Nevada	---------	---------	---------	---------	---------	---------	---------
Pacific	**3**	**10**	**4**	**104**	**3**	**44**	**117**
Washington	---------	---------	---------	18	---------	---------	25
Oregon	1	1	3	13	1	9	29
California	2	9	1	73	2	35	63
Alaska	---------	---------	---------	---------	---------	---------	---------
Hawaii	---------	---------	5	2	---------	---------	---------

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[1] New York City only.

Reported Cases of Selected Communicable Diseases: United States, Week Ended August 19, 1950—Continued

[Numbers under diseases are International List numbers, 1948 revision]

Area	Rocky Mountain spotted fever (104)	Scarlet fever (050)	Smallpox (084)	Tularemia (059)	Typhoid and paratyphoid fever[1] (040, 041)	Whooping cough (056)	Rabies in animals
United States	**26**	**239**	**1**	**11**	**102**	**2, 353**	**80**
New England		**16**			**3**	**245**	
Maine						44	
New Hampshire						4	
Vermont						26	
Massachusetts		15			3	79	
Rhode Island						33	
Connecticut		1				59	
Middle Atlantic	**2**	**37**			**18**	**325**	**23**
New York	2	[2] 21			3	134	23
New Jersey		4				105	
Pennsylvania		12			15	86	
East North Central	**4**	**59**			**13**	**633**	**10**
Ohio	4	28			4	188	2
Indiana		4			4	29	
Illinois		6			3	52	1
Michigan		9			1	214	6
Wisconsin		12			1	150	1
West North Central		**17**	**1**		**4**	**137**	**1**
Minnesota		3				13	
Iowa		4			1	37	1
Missouri		6			2	46	
North Dakota						7	
South Dakota		1				4	
Nebraska		3				6	
Kansas			1		1	24	
South Atlantic	**15**	**45**		**3**	**19**	**301**	**17**
Delaware						7	
Maryland	2	1			1	54	
District of Columbia		1				8	
Virginia	3	13		2	3	33	2
West Virginia		2			4	38	4
North Carolina	7	16		1	3	105	
South Carolina	1	3			1	17	7
Georgia	2	6			3	29	4
Florida		3			4	10	
East South Central	**3**	**22**			**8**	**102**	**10**
Kentucky		1			2	62	1
Tennessee	1	12			4	12	7
Alabama	2	3			2	25	2
Mississippi		6				3	
West South Central		**15**		**7**	**20**	**281**	**16**
Arkansas		1		6	4	25	1
Louisiana					5		
Oklahoma		4			2	13	1
Texas		10		1	9	243	14
Mountain	**2**	**4**		**1**	**9**	**128**	
Montana	2					24	
Idaho					3	8	
Wyoming							
Colorado		1			4	31	
New Mexico		2			1	28	
Arizona		1			1	32	
Utah				1		4	
Nevada						1	
Pacific		**24**			**8**	**201**	**3**
Washington		4				56	
Oregon		1				37	
California		19			8	108	3
Alaska							
Hawaii		1				1	

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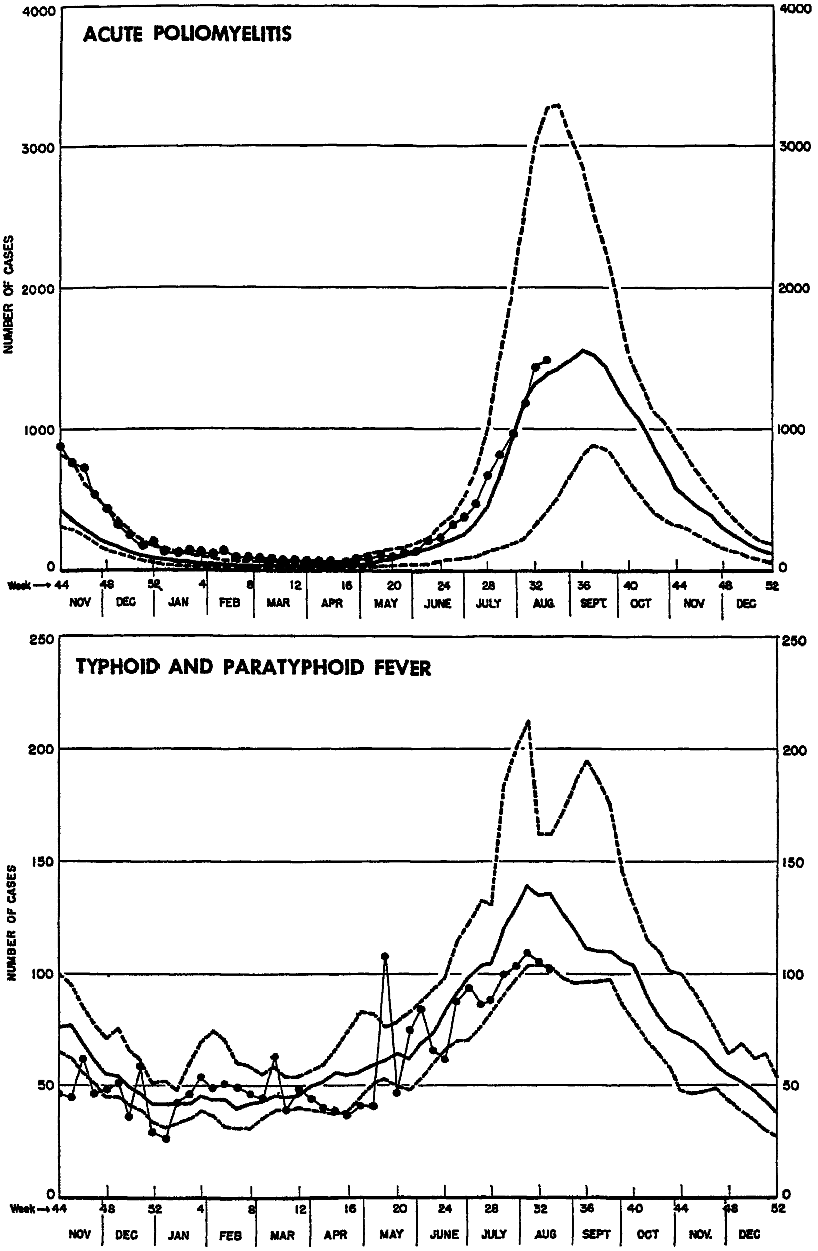
[1] Including cases reported as salmonellosis.

[2] Including cases reported as streptococcal sore throat.

Communicable Disease Charts

All reporting States, November 1949 through August 19, 1950



The upper and lower broken lines represent the highest and lowest figures recorded for the corresponding weeks in the 5 preceding years. The solid line is a median figure for the 5 preceding years. All three lines have been smoothed by a 3-week moving average. The dots represent numbers of cases reported for the weeks, 1949–50.

FOREIGN REPORTS

CANADA

Reported Cases of Certain Diseases—Week Ended July 29, 1950

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Brucellosis						2	2			3	7
Chickenpox			20	2	26	124	21	10	34	35	272
Diphtheria					1						1
Dysentery, bacillary					8	3				1	12
German measles	1		5	1	1	77		3	5	18	111
Influenza			6			1	1				8
Measles			7		135	200	3	9	6	66	426
Meningitis, meningococcal								2			2
Mumps			5	1	18	123	4	19	39	11	220
Poliomyelitis				1	7	4		5	4	5	26
Scarlet fever				1	18	9	2	1	11	4	46
Tuberculosis (all forms)	16		19	3	57	38	29	10	48	37	257
Typhoid and paratyphoid fever					1			1			2
Venereal diseases:											
Gonorrhea	8		11	7	84	52	38	20	34	92	346
Syphilis	8		18	4	58	19	8	5	2	13	135
Whooping cough	1			1	56	53	4	3	1	36	155

JAPAN

Reported Cases and Cumulative Totals of Certain Diseases and Deaths—4 Weeks Ended June 24, 1950

Disease	4 weeks ended June 24, 1950		Total reported for the year to date	
	Cases	Deaths	Cases	Deaths
Diarrhea, infectious	24		46	
Diphtheria	724	48	6, 319	602
Dysentery, unspecified	3, 402	678	7, 125	1, 354
Encephalitis, Japanese "B"	2	2	2	2
Filariasis	9		47	
Gonorrhea	14, 664		82, 142	
Influenza	46		18, 604	
Leprosy	59		303	
Malaria	137	2	401	21
Measles	8, 186		38, 506	
Meningitis, meningococcal	70	25	545	151
Paratyphoid fever	183	11	615	36
Pneumonia	8, 882		99, 815	
Poliomyelitis	263		906	
Puerperal infection	69		429	
Rabies	7		30	
Scarlet fever	868	1	2, 947	13
Schistosomiasis	61		230	
Smallpox			3	
Syphilis	10, 239		63, 524	
Tetanus	204		854	
Trachoma	23, 285		82, 715	
Tuberculosis	41, 603		214, 640	
Typhoid fever	572	64	2, 033	263
Typhus fever	34	1	888	52
Whooping cough	12, 172		66, 219	

NOTE.—The above figures have been adjusted to include delayed and corrected reports.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

The following reports include only items of unusual incidence or of special interest and the ocurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

Burma. During the week ended July 29, 1950, 31 cases of cholera, with 19 deaths, were reported in Burma.

India (French). During the week ended July 22, 1950, 231 cases of cholera were reported in Pondicherry, French India.

Indochina. During the week ended August 5, 1950, two cases of cholera were reported in the rural area of Cantho, Viet Nam.

Pakistan. Cholera has been reported in East Bengal Province as follows: Weeks ended—July 8, 371 cases, 196 deaths; July 15, 290 cases, 180 deaths; July 22, 321 cases, 199 deaths.

Plague

Belgian Congo. During the week ended August 5, 1950, one fatal case of plague was reported at Malali, south of Blukwa, Stanleyville Province.

Indochina. During the week ended August 5, 1950, one case of plague was reported in Phanthiet, and on August 7, one fatal case was reported in the Thudaumot area, Viet Nam.

Union of South Africa. In Orange Free State, five cases of plague were reported during the month of April 1950. During the week ended July 22, one fatal case was reported in the municipal area of Johannesburg, Transvaal Province.

Smallpox

India (French). During the week ended July 22, 1950, 99 cases of smallpox were reported in Pondicherry, French India.

Indonesia. During the week ended July 29, 1950, smallpox was reported in Indonesia as follows: In Surabaya, Java, 234 cases; in Medan, Sumatra, 41 cases.

Mexico. During the period April 30–June 24, 1950, 85 cases of smallpox were reported in Mexico, including 35 cases in Michoacan State, 19 in Nayarit State, and 17 in Jalisco State.

Union of South Africa. Smallpox has been reported in Transvaal Province as follows: March 1–31, 1950, 83 cases; April 1–30, 133 cases; May 1–31, 26 cases. For the period August 3–9, 9 cases were reported in Cape Province, and 9 cases in Transvaal Province.

Typhus Fever

Algeria. Reports of typhus fever in Algeria have been received as follows: For the period July 11–20, 1950, four cases (including one case in the port of Bone); July 21–31, three cases.

Ecuador. Forty cases of typhus fever were reported in Equador during the month of June 1950.

Guatemala. During the month of May 1950, six cases of typhus fever, with two deaths, were reported in Guatemala.

Union of South Africa. Cases of typhus fever have been reported in Union of South Africa as follows: March 1–31, 1950, 13; April 1–30, 10; May 1–31, 9; June 4–24, 15.

Plague Infection in San Miguel County, N. Mex.

Under date of August 17, 1950, plague infection was reported proved in a specimen of 46 fleas as follows: *Hystrichopsylla gigas, Malaraeus telchinum, Monopsyllus wagneri,* and *Epitidea wenmanni.* This specimen was taken from 24 deer mice, *Peromyscus maniculatus,* trapped August 4, 1950, 1 mile northeast of Cowles in San Miguel County, N. Mex. This is the first time that rodent plague has been proved to exist in this county.

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The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Availability of Fluorine in Sodium Fluoride vs. Sodium Fluosilicate

By F. J. McClure, Ph.D.*

Sodium fluoride is the source of fluorine for the majority of current studies testing the efficacy of fluoridation of community drinking water for the partial control of human dental caries (*1, 2, 3, 4, 5*). On the basis of solubility and availability of fluorine, as well as the innocuous character of the accompanying sodium, sodium fluoride is a logical source of fluorine. At the same time any large-scale program of community water fluoridation must calculate its cost, and other fluorine compounds may be available at less expense and may be equally efficacious. Thus, with sodium fluosilicate currently selling at about half the price of sodium fluoride, the cost of chemicals for the fluoridation of 1,000,000 gallons of water at an optimum level of 1.0 ppm fluorine is approximately $2.15 using sodium fluoride and 76 cents for an equivalent quantity of sodium fluosilicate.[1]

The consideration of a fluosilicate as a fluorine carrier instead of sodium fluoride has raised the question as to the relative physiological effects of a complex chemical such as sodium fluosilicate vs. sodium fluoride.

Generally speaking, the physiological effects of different fluoride salts will depend on their absorbability from the intestinal tract which may be a direct function of solubility, particularly if relatively large quantities are ingested. But if the quantities of fluoride ingested are very small, the effects of differences in solubility will tend to diminish if not to disappear entirely. Such is the situation on the addition of sodium fluoride or sodium fluosilicate to a drinking water where the concentration does not exceed 1.0 ppm fluorine. It is not to be anticipated therefore that the wide difference in solubility[2] between these two compounds would influence their physiological effects when ingested in very dilute solutions.

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*From The National Institute of Dental Research of The National Institutes of Health, Bethesda, Md.

[1] The market price of these chemicals, according to Chemical and Engineering News for April 24, 1950, is sodium fluoride 95 percent c. l., wks. 0.10½ c. per lb.; sodium fluosilicate, bbl., cl., 0.04½ c. per lb. The latter compound is also known as sodium silicofluoride.

[2] NaF at 18° C. is approximately 4.0 percent soluble whereas Na_2SiF_6 is soluble to the extent of about 0.65 percent.

In dilute aqueous solutions the hydrolysis of these two fluorine salts yielding fluorine ions is comparatively simple in the case of sodium fluoride, which is practically completely ionized, but quite complex and somewhat obscure in the case of sodium fluosilicate. Although several mechanisms have been proposed, the following reactions of sodium fluosilicate account for the presence of fluoride ions in dilute solutions of sodium fluosilicate.

$$Na_2SiF_6 \longrightarrow 2\ Na^+ + SiF_6^=$$
$$2\ H_2O + SiF_6^= \longrightarrow 4\ H^+ + 6F^- + SiO_2$$

The later reaction is postulated by Kubelka and Pristoupil (*6*) and also by Ryss and Slutskaya (*7*). Ryss (*8*) studied the hydrolysis of Na_2SiF_6 at 11° C. at concentrations of 0.02 M. to 0.00048M., and determined the following equilibrium constants:

$$SiF_6^= \longrightarrow SiF_4 + 2F^-$$
$$K_1 = 0.65 \times 10^{-6}$$
$$SiF_4 + 2\ H_2O \longrightarrow SiO_2 + -4\ HF$$
$$K_2 = 1.04 \times 10^{-8}$$
$$SiF_6^= + 2\ H_2O \longrightarrow SiO_2 + 4\ H^+ + 6\ F^-$$
$$K_3 = 5.4 \times 10^{-27}$$

Rees and Hudleston (*9*) suggest a slow reaction as follows:

$$SiF_6^= \longrightarrow SiF_4 + 2F^-$$

followed by a relatively rapid reaction

$$SiF_4 + 3\ H_2O \longrightarrow 4HF + H_2SiO_3$$

As would be expected in the light of the above evidence, aqueous solutions of sodium fluosilicate have an acid reaction in the range of pH 3. 5–4. 0, and the hydrolysis is sufficient also to permit a quantitative titration of fluosilicate solutions with a standard alkali or with a standard solution of sodium carbonate.

The physiological effects of sodium fluosilicate vs. sodium fluoride have been observed most often in chronic fluorine toxicosis manifested by the characteristic effects of fluorine on rats' incisor teeth. De Eds and Thomas (*10*) thus compared NaF, Na_2SiF_6 and Na_3AlF_6 at levels of 14–16 ppm fluorine and concluded that chronic fluorine intoxication in rats as mainfested by bleaching of the rats' incisors occurred to practically the same extent from all the above fluorides. Smyth and Smyth (*11*) compared barium fluosilicate and cryolite (Na_3AlF_6) when fed to rats at levels of approximately 40 and 80 ppm fluorine and concluded that "the chronic toxicity of these compounds is substantially the same as that of sodium fluoride for the same fluorine content." (*11*) They observed a total of 246 rats and based their conclusions on rate of growth, fecundity, mortality, tooth development, organ pathology, and disease. Smith and Leverton (*12*) studied the effects of a number of different fluorides when fed to rats so as to provide 14 ppm fluorine in the ration. Their conclusions, although based on comparatively few rats, were summarized as follows:

"Fluorine combined as ammonium and potassium fluoride or as barium, potassium and sodium fluosilicate was found to have the same acute toxicity as when combined as sodium fluoride . . . It would appear, therefore, that there is not a great difference in toxicity of fluorine in different combinations when the amount required to produce the first discernible effect upon the tooth is the basis for comparison . . . It was found that a daily dose of 0.2 mg. of fluorine from any of the sources tested resulted in abnormal incisors of the 1-type . . . Barium fluosilicate in spite of its relative insolubility has been found in every case to equal sodium fluoride in toxicity when fed at the same level of fluorine . . . It has not been possible to demonstrate a contributing toxic effect of either barium or silicon."

A comparative study of the rate of retention and paths of excretion of fluorine when fed to rats as sodium fluoride, sodium fluosilicate, and calcium fluoride was made by Kick et al. (*13*). The data acquired are as follows:

	Fluorine source			
	Na_2SiF_6	Na_2SiF_6	NaF	CaF_2
Number of rats	3	3	3	3
Approximate initial weight (gm.)	125	125	125	125
Days on experiment	23	22	18	11
Fluorine ingested—total mg	269. 9	269. 9	211. 2	229. 2
Fluorine ingested—daily mg	11. 7	12. 3	11. 7	20. 8
Fluorine in feces (mg.)	94. 3	94. 4	116. 5	225
Fluorine in feces (percent)	34. 94	34. 98	55. 16	98. 17
Fluorine in urine (mg.)	93. 6	90. 2	25. 8	4. 2
Fluorine in urine (percent)	34. 68	33. 42	12. 22	1. 83
Fluorine absorbed (mg.)	175. 6	175. 5	94. 7	4. 1
Fluorine absorbed (percent)	65. 06	65. 02	44. 84	1. 78
Fluorine balance (mg.)	+82. 0	+85. 3	+68. 9	−00. 1
Fluorine balance (percent)	30. 38	31. 60	32. 62	. 04

In this instance there was no difference between sodium fluosilicate and sodium fluoride as regards the ultimate percent of fluorine retained in the rat's body, i. e., the percent fluorine balance in the above data. There were some differences, however, in the paths of excretion, i. e., in the urine or feces.

The metabolism of cryolite (Na_3AlF_6), another complex fluoride, has been studied quite extensively (*14*, *15*, *16*) and the results may be of interest for comparison with the metabolism of Na_2SiF_6. A study of the toxicity of fluorine in calcium fluoride and in cryolite (*14*, *15*) thus brought out evidence that "the fluorine in cryolite is no more toxic to growing rats nor is it retained in the body to a greater extent than the fluorine in calcium fluoride, when both are administered in aqueous solution at the rate of 0.58 mg. per kilogram of body weight daily. . . . The appearance of striations in the incisor teeth is equally rapid with both fluorine compounds" (*14*). On the average approximately 59 percent of the ingested fluorine from both calcium fluoride and cryolite was retained by growing rats (*14*). In making this comparison of cryolite and calcium fluoride it was assumed by these authors that the fluorine in potable waters, insofar as it is in a nonionized condition, is in the form of calcium fluoride. In other experiments with cryolite, somewhat older rats retained the fluorine from synthetic cryolite, fine natural cryolite, and coarse natural cryolite in the following percentages, respectively: 36.14 percent, 32.03 percent, and 30.70 percent. Kick et al. (*13*), as already noted, also found about 30 percent of the fluorine in sodium fluosilicate, and sodium fluoride was retained by half-grown rats. The percent retention figures we obtained in this study agree with these later percentage figures (*13*, *14*).

For a comprehensive review of sodium fluosilicate, its industrial uses and properties, a recent article by Hampel (*17*) should be consulted.

Plan of Experiment

One of the most pronounced biological effects of fluorine is its deposition in body tissues, particularly in bones and teeth. The body-retention of fluorine as offered to growing rats in the form of sodium fluoride and sodium fluosilicate is a reliable comparative criteria, therefore, of the physiological properties of these two chemically different fluorides. Specifically, in these experiments sodium fluoride and sodium fluosilicate were added to rats' drinking water in fluorine-equivalent quantities, and the concentration of fluorine in the rats' body tissues was determined.

Four series of experiments were completed as shown in tables 1, 2, 3, and 4 and in figures 1 and 2. In experiment 1 (table 1), groups of rats were fed ad libitum and drank water (ad libitum) containing 5, 10, 15, 25, and 50 ppm of fluorine added as sodium fluoride or sodium fluosilicate. After 90 to 100 days on the fluoride regimen, the rats were killed and the incisor teeth, molar teeth, mandibles, and femurs were analyzed for ash, calcium, phosphorus, and fluorine. In this experiment and in the succeeding experiments, the rats' diet consisted of cornstarch 66.5 percent, whole milk powder 27.0 percent, yeast 5.0 percent, cod liver oil 1.0 percent, NaCl 0.5 percent, 10 ppm of copper, and 100 ppm of iron.

In experiment 2, 11 litter mate pairs of weanling rats were given drinking water containing 5.0 ppm fluorine as sodium fluoride or sodium fluosilicate. The daily intake of drinking water was measured, so that each pair of rats ingested equal quantities of the respective fluorides. The rats were on experiment an average of 81 days. At the end of the experiment the rats were killed and the ash and fluorine content of the molar teeth, incisor teeth, and femurs were determined.

Table 1. *Comparison of fluorine ingested as* NaF *vs.* Na_2SiF_6 *by rats from drinking water and retention of fluorine and effect on ash, calcium, and phosphorus in bones and teeth*

	NaF	Na_2SiF_6	NaF	Na_2SiF_6	NaF	Na_2SiF_6	NaF	Na_2SiF_6	NaF	Na_2SiF_6	Averages	
											NaF	Na_2SiF_6
Fluorine in drinking water (ppm)	5	5	10	10	15	15	25	25	50	50		
Number of rats	20	20	17	19	19	20	17	23	23	27	(96)	(109)
Days on experiment	90	90	92	92	07	97	99	99	103	103	96	96
Initial weight (gm.)	30	30	30	30	31	30	32	30	30	30	30	30
Final weight (gm.)	122	115	131	134	139	148	145	162	148	148	137	143
Total gain (gm.)	92	85	101	104	108	118	113	132	118	118	107	113
Average daily gain (gm.)	1.0	0.9	1.1	1.1	1.1	1.2	1.1	1.3	1.1	1.1	1.1	1.2
	Results of tissue analyses in percentages											
Incisor teeth-ash	73.33	81.77	81.40	80.60	81.95	80.13	80.68	80.72	79.73	81.62	79.42	80.97
Fluorine in ash	.020	.017	.041	.030	.050	.065	.094	.086	.117	.129	.070	.065
Calcium in ash	33.70	34.80	34.18	34.66	34.65	34.45	33.47	22.84	34.80	34.44	35.62	34.26
Phosphorus in ash	19.53	19.13	19.12	20.25	18.58	19.82	19.62	20.08	18.72	20.52	19.11	19.96
Calcium to phosphorus in ash	1.73	1.82	1.70	1.71	1.86	1.71	1.71	1.64	1.86	1.68	1.79	1.72
Molar teeth-ash	75.37	77.96	76.63	76.92	76.05	75.72	77.14	76.95	76.82	77.36	76.40	76.98
Fluorine in ash	.039	.037	.061	.059	.092	.086	.110	.123	.170	.186	.095	.098
Calcium in ash	36.17	35.77	35.41	36.84	35.33	35.05	36.47	36.07	35.34	35.50	35.74	35.85
Phosphorus in ash	18.37	17.70	18.15	18.63	18.12	18.90	18.27	17.41	17.57	16.92	18.10	17.92
Calcium to phosphorus in ash	1.97	2.01	1.95	2.09	1.95	1.85	2.00	2.07	2.01	2.10	1.98	2.00
Mandibles-ash	67.70	70.71	69.88	68.52	70.17	69.29	69.99	69.21	69.49	70.33	69.45	69.62
Fluorine in ash	.062	.057	.101	.096	.163	.161	.216	.220	.347	.329	.178	.173
Calcium in ash	36.23	37.17	36.14	36.06	36.75	37.25	35.56	37.01	37.17	36.21	36.37	36.74
Phosphorus in ash	18.00	18.76	17.71	18.22	17.35	16.96	18.00	17.46	18.31	18.58	17.87	18.00
Calcium to phosphorus in ash	2.01	1.99	2.04	1.98	2.12	2.20	1.98	2.12	2.03	1.95	2.04	2.04
Femur-ash	58.85	62.77	62.23	59.28	64.20	65.22	63.65	66.10	62.32	67.35	62.25	64.16
Fluorine in ash	.077	.063	.126	.116	.186	.182	.270	.281	.421	.393	.217	.207
Calcium in ash	36.72	34.85	36.05	36.36	37.65	37.06	36.52	36.27	37.77	36.62	36.91	36.23
Phosphorus in ash	18.78	18.24	18.26	18.20	18.94	18.44	18.46	17.78	18.48	17.97	18.58	18.13
Calcium to phosphorus in ash	1.96	1.91	1.97	2.00	1.99	2.01	1.98	2.04	2.04	2.04	1.99	2.00

Table 2. *Comparison of* NaF *vs.* Na_2SiF_6 *as a source of 5 ppm fluorine in rats' drinking water (average data for 11 pairs of rats in experiment 2)*

Experiment data	Fluorine exposure	
	NaF	Na_2SiF_6
Total fluorine intake (mg.)	5.4	5.4
Initial body weight (gm.)	39.4	36.8
Total gain in weight (gm.)	153.2	142.5
Days on experiment	81.0	81.0
Average daily gain (gm.)	1.89	1.76
Molar teeth analysis		
Total weight (mg.)	113.6	135.0
Percent ash	76.91	76.85
Percent fluorine in ash	.029	.032
Total fluorine (mg.)	.025	.033
Incisor teeth analysis		
Total weight (mg.)	249.4	235.8
Percent ash	74.57	74.62
Percent fluorine in ash	.017	.018
Total fluorine (mg.)	.032	.031
Femur analysis		
Total weight (mg.)	699.1	616.4
Percent ash	61.38	64.38
Percent fluorine in ash	.070	.065
Total fluorine (mg.)	.301	.259

In experiment 3, the rats ingested 15 ppm fluorine in drinking water. Over a period of 98–100 days, paired rats were given equal quantities of fluorine as sodium fluoride or sodium fluosilicate. In this experiment, food and water consumption was ad libitum but the water ingestion was measured. At the end of the experiment, the rats were killed and an analysis of ash and fluorine was made on the molar and incisor teeth and on the mandibles. The remaining body carcass was also analyzed for fluorine. In experiment 4, a comparison was made between sodim fluoride, sodium fluosilicate, and sodium fluoride plus sodium silicate using seven trios of rats. The fluorine in the drinking water was 25 ppm. The sodium fluosilicate solution contained 6.2 ppm of silicon. Sodium silicate was added to sodium fluoride to furnish 15 ppm of silicon in order to test the effect of silicon per se on the fluorine retention.

The molar teeth, incisor teeth, and the body carcass were analyzed for ash and fluorine.

In experiments 3 and 4, the measurements of total fluorine intake and subsequent analysis for total fluorine in the rat's body furnished data for a calculation of the total fluorine retained by the rats, i. e.,

Table 3. *Comparison of* NaF *and* Na_2SiF_6 *as a source of 15 ppm of fluorine in rats' drinking water (average data for 10 pairs of rats)*

Experiment data	Fluorine exposure	
	NaF	Na_2SiF_6
Total fluorine intake (mg.)	19.8	20.2
Initial body weight (gm.)	36.9	38.8
Total gain in weight (gm.)	165.7	168.2
Average daily gain (gm.)	1.69	1.68
Molar teeth analysis		
Total weight (mg.)	131.7	130.1
Percent ash	77.18	76.72
Percent fluorine in ash	.087	.093
Total fluorine (mg.)	.088	.093
Incisor teeth analysis		
Total weight (mg.)	245.5	257.5
Percent ash	77.88	76.85
Percent fluorine in ash	.062	.066
Total fluorine (mg.)	.118	.130
Mandibles analysis		
Total weight (mg.)	307.7	311.1
Percent ash	69.98	69.93
Percent fluorine in ash	.145	.153
Total fluorine (mg.)	.313	.332
Fluorine in carcass* (mg.)	6.035	6.729
Total fluorine retained (mg.)	6.553	7.284
Total percent fluorine retained	33.10	36.06

*Minus mandibles, molars, and incisors

the fluorine balance. Preparation of the rats' tissues for analysis was as follows: the digestive tract was removed and emptied of food residues, and the entire carcass autoclaved for 10 minutes at 15 pounds pressure. Incisor and molar teeth, mandibles, and femurs were removed and the remainder of the carcass was mascerated to a homogeneous pulp in a Waring Blendor.

Fluorine was determined in the teeth and bones by first extracting them with alcohol and ether drying, and ashing at 550° C. An aliquot sample of the homogenized carcass was dried and ashed at 550° C. using a CaO suspension as a fixative, and fluorine was determined on the ash. The fluorine in the ash was determined by the usual steam distillation from perchloric acid, evaporation of the distillate, and titration with standard thorium nitrate (*18*).

Results of Experiments

In all these experiments on the growing rats, no different effects of sodium fluoride and sodium fluosilicate became apparent. Groups of

Table 1. *Comparison of* NaF, Na_2SiF_6, *and* $NaF+Na_2SiO_3$ *as a source of 25 ppm fluorine in rats' drinking water (average data for 7 trios of rats)*

Experiment data	Fluorine exposure		
	NaF	Na_2SiF_6	$NaF+$ Na_2SiO_3
Total fluorine intake (mg.)	33. 0	31. 5	33. 3
Initial body weight (mg.)	38. 4	36. 1	44. 4
Total gain in weight (gm.)	137. 9	159. 6	161. 0
Days on experiment	107. 0	105. 0	106. 0
Average daily gain (gm.)	1. 29	1. 52	1. 51
Molar teeth analysis			
Total weight (mg.)	126. 5	134. 2	137. 5
Percent ash	77. 16	77. 23	77. 72
Percent fluorine in ash	. 178	. 176	. 187
Total fluorine (mg.)	. 173	. 183	. 220
Incisor teeth analysis			
Total weight (mg.)	263. 2	261. 1	276. 8
Percent ash	78. 28	77. 91	77. 36
Percent fluorine in ash	. 101	. 101	. 103
Total fluorine (mg.)	. 208	. 204	. 221
Fluorine in carcass* (mg.)	12. 29	12. 69	10. 58
Total fluorine retained (mg.)	12. 66	13. 07	11. 02
Total percent fluorine retained	38. 36	41. 49	33. 09

*Minus molar and incisor teeth.

rats ingesting fluorine in their drinking water ad libitum at levels of 5, 10, 15, 25, and 50 ppm fluorine, as sodium fluoride and sodium fluosilicate (table 1), did not have different percentages of fluorine in the ash of the bones and teeth which could be related to the kind of fluoride fed. Similarly, no differences occurred in the percent of ash calcium and phosphorus and the calcium to phosphorus ratio in the molar and incisor teeth, mandibles, and incisors. Average daily gain in body weight was similar in all groups of rats.

The data in table 2 were obtained by equalizing the drinking water ingested by pairs of rats over a period of 81 days, so that the total quantity of fluorine was the same for both rats of a pair. The average results for 11 pairs of rats receiving 5 ppm fluorine in their drinking water are shown in table 2. Here again it is apparent that the percent of fluorine in the ash of the molar teeth, incisor teeth, and femurs was not related to the source of fluorine, i. e., sodium fluoride or sodium fluosilicate.

The fluid intake was measured, and the final total quantity of drinking fluid (and thus the total fluorine ingested) was equalized in 10 pairs of rats. The average results of this study appear in table 3.

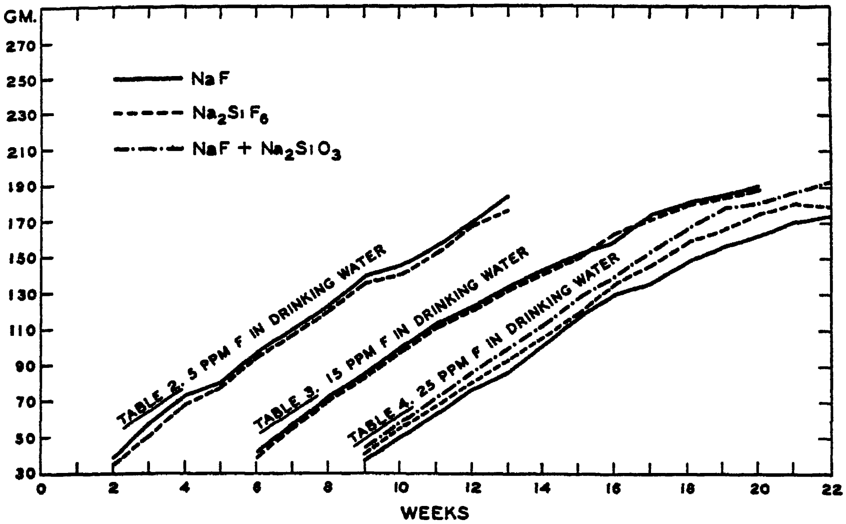

Figure 1. Average rate of growth of rats receiving sodium fluoride, sodium fluosilicate, and sodium fluoride plus sodium silicate in drinking water.

The amount of fluorine in the drinking water was 15 ppm. No differences in the ash and the fluorine content of the ash of teeth and mandibles occurred. The fluorine retained in the rat's entire body amounted to 33.10 percent of the total ingested as sodium fluoride, and 36.06 percent of the total ingested as sodium fluosilicate. The difference between these two percentage figures is not significant. In these 10 paired results for sodium fluoride vs. sodium fluosilicate the mean difference in percent retention was 2.96 with a standard error of ±6.56.

In table 4 are the results of adding 25 ppm fluorine to the drinking water as sodium fluoride, sodium fluosilicate, and sodium fluoride plus sodium silicate. No differences appear in the results for ash and fluorine in the molar and incisor teeth. While the percent of ingested fluorine which was retained by the rats receiving sodium fluoride plus sodium silicate amounted to 33.09 percent as compared with 38.36 percent retention of fluorine ingested as sodium fluoride alone, the difference between these two values is not statistically significant. The mean difference for these seven paired comparisons was 5.27; the standard error was ±5.89.

Similarly, there is no significance in the difference, 38.36 percent vs. 41.49 percent, i. e., the percent fluorine retained from sodium fluoride vs. sodium fluosilicate.

Figure 2 shows the relations between the fluorine in the ash of incisors, molars, mandibles, and femurs at different levels of fluorine in drinking water. As would be expected, these quantities are proportional to the fluorine ingested and the similarity between the two

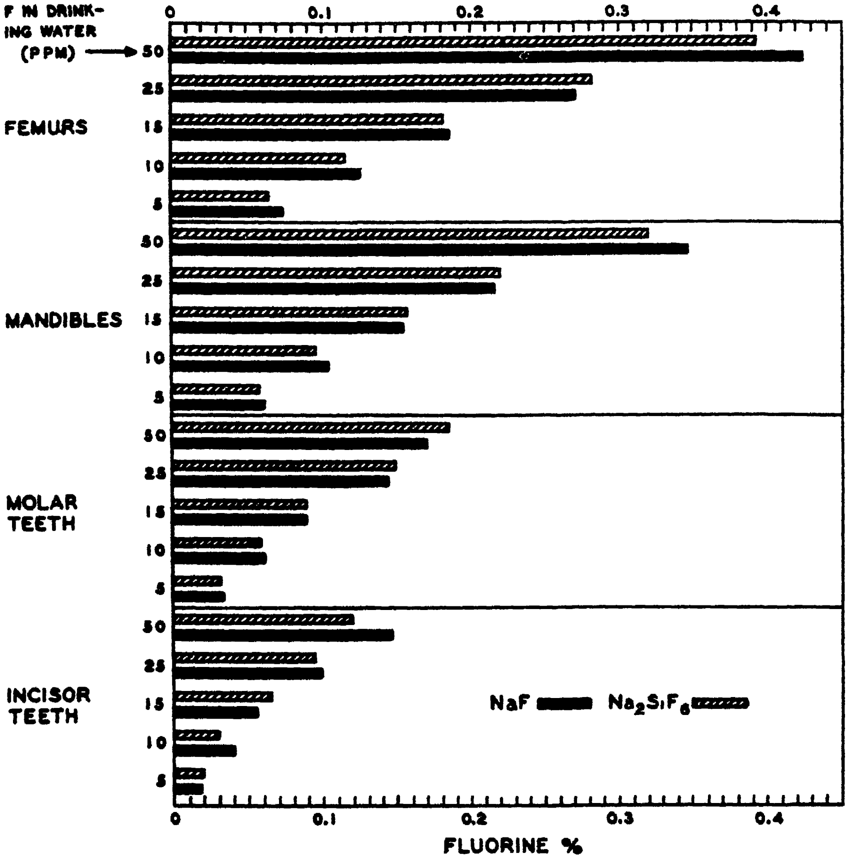

Figure 2. Fluorine in ash of bones and teeth of rats receiving fluorine as sodium fluoride or sodium fluosilicate in drinking water.

fluorides ingested is shown in the percentage figures. There is a slightly greater percent of fluorine in the ash of the femurs, than in the ash of mandibles, but there is also less ash in the femurs than in the mandibles. The percent fluorine in the fat-free mandibles and in the fat-free femurs is essentially the same.

The appearance of the characteristic striations in these rats' incisor teeth did not show variations which could be related to the kind of fluoride ingested. The striations varied with the level of fluorine in the drinking water and were most apparent in the lower incisors. At a level of 10 ppm fluorine, incisor striations were easily apparent under low power magnification. At 5 ppm fluorine in the drinking water, striations could not be seen, but there was some tendency toward slight depigmentation in several rats. Considerable spotty depigmentation occurred at 25 ppm fluorine and over.

The average rate of growth of the various groups of rats is indicated by the growth curves shown in figure 1. The essential similarity in rate of growth for all groups of rats suggests no differences in the rats' reaction to sodium fluoride vs. sodium fluosilicate. The presence of sodium silicate in the drinking water (experiment 4) also had no effect on growth.

These results are in general agreement with the previous evidence of similar physiological effects of these two fluorine compounds. While the similarity in the quantities of fluorine retained in the teeth and skeletal tissues is the most pertinent evidence obtained in these experiments, the other data relative to ash, calcium and phosphorus, and the calcium to phosphorus ratio of bones and teeth, the rate of growth, and the appearance of characteristic striations in the rats' incisors, also contribute evidence that similar physiological effects result from these two fluorides.

As additional data are obtained, particularly with reference to dental caries effects, conclusions may be warranted regarding the possibility of substituting sodium fluosilicate for sodium fluoride, as a water fluoridizing agent. The data accumulated thus far, however, do not justify any commitments in this regard.

Summary

1. A comparison was made of the effect of fluorine ingested by rats from drinking water in the form of sodium fluoride vs. sodium fluosilicate; the quantity of fluorine equaled 5, 10, 15, 25, and 50 ppm.

2. No differences were observed in the quantity of fluorine deposited in the incisor and molar teeth, mandibles, and femurs, nor in the percent of the ingested fluorine which was retained in the rat's body. There was no difference in the ash, calcium, and phosphorus content of the incisor teeth, molar teeth, mandibles, and femurs which could be related to the kind of fluoride ingested.

3. There were no differences in the appearance of the characteristic striations on the rats' incisor teeth which could be attributed to the sodium fluoride vs. sodium fluosilicate.

4. The presence of 15 ppm of silicon as sodium silicate along with 25 ppm of fluorine as sodium fluoride did not affect the amount of fluorine deposited in the rat's body.

5. The rate of growth was normal in all groups of rats.

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Use of the Chick Embryo for Isolation of *Brucella*

Multiplication of the Organism in the Yolk Sac and Selection of the Embryo Age Optimal for Isolation From Blood

By KATHLEEN GAY, B.S., and S. R. DAMON, Ph.D.*

Public health laboratories have long been concerned with the problem of isolating *Brucella* from blood specimens and in many instances have felt that the available means of isolation, by cultural methods and by guinea pig inoculation, have not been adequate. Not only has the percent of recoveries from patients reported as having clinical brucellosis been low, but the time and cost involved in making these isolations have been excessive. Consequently, soon after commencement of the Indiana Brucellosis Study Project the question arose as to whether or not there might be a more satisfactory means of isolating *Brucella.*

This report presents the first phase of the study of the chick embryo as a possibly superior enrichment medium for the recovery of *Brucella* from the blood stream.

Review of Literature

As early as 1937 Goodpasture and Anderson (*1*), studying the infectivity of *Br. abortus* for the chick embryo, showed that this organism reproduced within living cells of the chorio-allantoic membrane. More recently, various investigators of the pathology and infectious nature of brucellosis, e. g., Buddingh and Womack (*2*) and Ruiz-Castaneda (*3*), have presented a picture of the causative organism as preferentially an intracellular parasite. In view of the fact that this multiplication within the cell is a character common to viruses and rickettsiae, it seemed logical that the techniques employed in isolating these agents would be applicable to the recovery of *Brucella.* Because the yolk is highly nutritive and the sac itself is capable of receiving a sizeable amount of blood inoculum without injury to the developing embryo, as already determined by virologists, this region of the incubating egg was selected first for study.

Most investigations of *Brucella* in which the yolk-sac technique has been employed have been in the study of therapeutic agents and the pathology of the infection. Spink et al. (*4*), in evaluating antibiotics, used a *Br. abortus* inoculum of approximately 356 organisms and consistently recovered them from embryo livers 24 to 72 hours later. Still others have used a much more concentrated inoculum. However, since injection of numbers of organisms comparable to those in a natural blood specimen could not always be assured, it appeared that the first step should be a study of the multiplication of minimal inocula within the yolk material itself. Also, since there are known generally to be certain conditions under which an inoculum of a few organisms fails to multiply, it seemed essential to determine whether or not these conditions existed in the yolk sac at certain stages of embryonic development.

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The experiments presented in this report and the resulting growth curves formed the basis for selecting a particular embryo age to be used in attempted recoveries of *Brucella* from the blood stream, and the subsequent elimination of other ages as probably unsatisfactory.

Materials and Methods

White leghorn eggs from pullorum-free flocks were used throughout the experiments. The average weight of each was 59.25±3.46 gm. Incubation before and after inoculation was in a regular egg incubator set at 98°–99° F. (37° C.±) and equipped with an automatic turning device. The relative humidity was held at 50°–56°. The three *Brucella* strains used (*melitensis* No. 4463, *abortus* No. 318 and *suis* No. 614) had been isolated in this laboratory from the blood stream of patients showing an agglutination titer of 1:320 or higher. All three strains were completely typical of their respective types and were kept under refrigeration on tryptose agar slants and transferred every 3 months. Throughout the experiments their virulence for chick embryos did not change, the *melitensis* strain producing 100 percent death at 5–6 days; *suis*, at 4–5 days; and *abortus*, at 7–8 days.

Preparation of a Standard Inoculum

In preparing a standard inoculum for injection into the yolk sac of the embryos, a method which consistently gave a comparable number of organisms per aliquot of broth diluent was devised and followed throughout. It was briefly this: a tryptose agar plate streaked from the stock slant was incubated 3–4 days and a colony transferred to 10 ml. of tryptose broth. Exactly 24 hours later the incubated broth culture was diluted 10^{-5} (tenfold dilutions in 10 ml. total volumes) for *melitensis* and *abortus*, and 10^{-6} for the faster growing *suis* strain. The *abortus* strain required incubation in a CO_2 atmosphere of approximately 10 percent for multiplication. The foregoing technique resulted in a standard inoculum for each egg group as shown in the table.

Determination of Bacterial Inoculum

The determination of the number of organisms which each egg received and the logarithms of the counts plotted for the growth curves is based upon a technique proposed by Miles and Misra (*5*). Six 0.02 ml. aliquots of the dilution to be examined were placed in spots upon the surface of each of six tryptose agar plates (the tryptose buffered to pH 6.6 with NaOH) which had been dehydrated sufficiently to absorb the diluent in 15 minutes. The plates were then incubated at a constant temperature (36° C.) for 3 to 4 days, and a colony count was made from the growth resulting at the location of each spot of absorbed liquid. On the basis of previous experience, a range of dilutions was selected for plating so that one would show between 5–50 colonies per 0.02 ml.; the bacterial numbers were then calculated from the definitive dilution in each instance.

Inoculation and Examination of the Yolk

After each egg had been candled for normal development and for embryo position, a small hole was made at the large end with a table model dental drill and a No. 6 carborundum point. The injection was made through this opening with a tuberculin syringe and 20-gage needle so that the inoculum was introduced centrally into the yolk sac. Before and after inoculation, the area around the opening was painted with tincture of iodine and the hole finally sealed with collodion. On the day the yolk was to be examined, a portion was withdrawn in a manner similar to that of the injection, and tenfold serial dilutions in 1.0 ml. total volumes were made immediately. These dilutions were plated as previously described for the determination of the bacterial inoculum.

Experimental Results

Melitensis *Growth Curves*

The first growth curve of the *melitensis* strain (curve A in fig. 1) was obtained by injecting the standard inoculum, i. e., 0.1 ml. of the 10^{-5} dilution of a 24-hour broth culture, into the yolk sacs of 24-hour embryos. Each day thereafter, until the completion of the curves, the eggs were candled and three successive eggs which showed normal embryonic development were examined by withdrawing 0.1 ml. of the yolk and diluting it in tenfold serial dilutions sufficiently to obtain definitive bacterial counts, as described. Because of the error which would be introduced by the withdrawal of yolk, each daily examination was based upon the contents of three eggs which had not been previously examined. The number of bacteria per ml. of yolk was then computed on the basis of the method for determining bacterial numbers, the average of the three logarithms constituting one point on the curve.

This experiment was repeated, utilizing eggs which had incubated for 2, 3, 4, 5, and 6 days, respectively. The calculated numbers of bacteria each egg received are presented in the table.

Number of organisms in each inoculum

Egg group	Age of embryo	Numbers
A	1 day	22 ±2
B	2 days	102 ±4
C	3 days	79 ±3
D	4 days	72 ±5
E	5 days	78 ±3
F	6 days	95 ±3

The results of this experiment are presented in figure 1 as six curves which represent the relative rates of multiplication of *melitensis* when injected in small numbers into the yolk sacs of groups of embryos (A, B, C, D, E, and F) which had reached each of the six daily stages of development. Due to the difficulty of obtaining reliable counts from undiluted material, the lowest yolk dilution examined was the 10^{-1}. The curves terminate on the sixth day following the injection, since death of the embryos, irrespective of their ages when the inoculations were made, consistently occurred at this time. Each point on curves C, D, E, and F was obtained by averaging the logarithms of the bacterial counts from three eggs; however, curves A and B need a word of explanation. Repeated attempts usually failed to yield three comparable counts from these egg groups at any one time; conquently, each point is the logarithmic average of those eggs which showed growth, i. e., two or three eggs.

It will be seen from figure 1 that the curves obtained from egg groups C, D, E, and F, particularly from E and F, approximate one another whereas those from groups A and B indicate a definite variation. It should be noted that on the fourth day following injection, if growth occurred, irrespective of the age of the embryo when the injection was made, the curves tended to coalesce.

The table shows that the number of organisms contained in the inoculum injected into egg group A was fewer than those received by the other groups; however, other experiments have shown fairly well that this difference in numbers does not alter the picture.

Suis *and* Abortus *Growth Curves*

Since the 5-day-old chick embryos appeared to provide the most favorable and most consistent environment for rapid multiplication

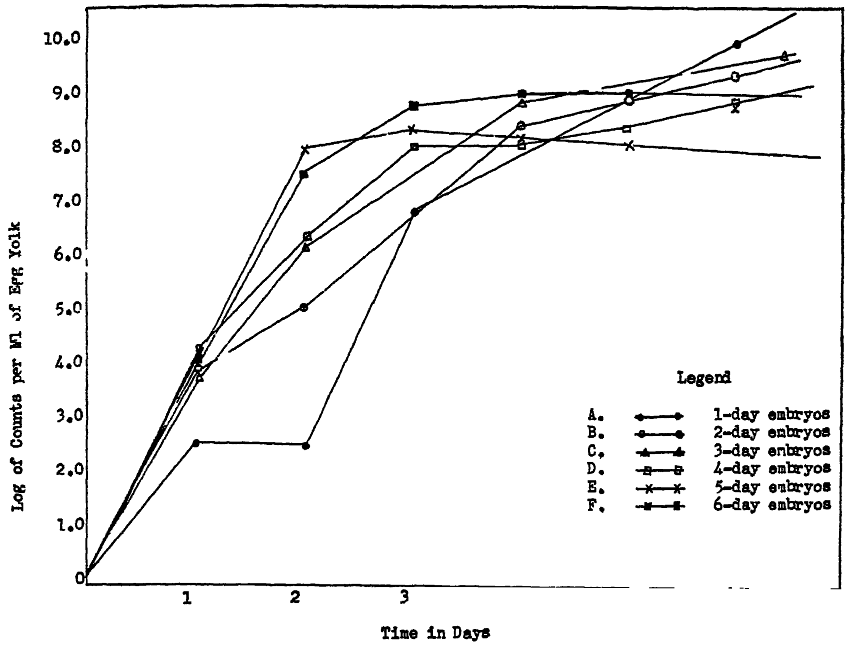

Figure 1. Curves showing multiplication of *Br. melitensis* when injected into yolk sacs of 1- to 6-day-old embryos.

of the *melitensis* strain, it seemed desirable to repeat the experiment with a *suis* and an *abortus* strain injected into the yolk sacs of 5-day-old embryos. The average number of *suis* organisms in each inoculum was 26 (±2), of *abortus*, 92 (±4). The results of this experiment are plotted in figure 2 against the base growth curve for *melitensis*, obtained in the foregoing experiments. Each plotted point represents the averaged logarithms of the counts obtained from three separate eggs.

The three strains examined appeared to multiply at a comparable rate.

Melitensis *Growth Curve in Presence of Blood*

An experiment was performed to see if the presence of blood would exhibit any bacteriostatic effect under the conditions of this study. A 24-hour broth culture of the *melitensis* strain was prepared as previously described and mixed with defibrinated rabbit blood in the proportion of 1 part of 10^{-5} culture dilution and 4 parts of blood. This mixture was incubated in a 37° C. water bath for 30 minutes, then it was again mixed thoroughly and 0.5 ml. injected into each of 23 eggs, the number of organisms per egg averaging 96 (±4). The egg yolk was then examined daily as in previous experiments and the results are presented in figure 3. Again, the curve obtained was

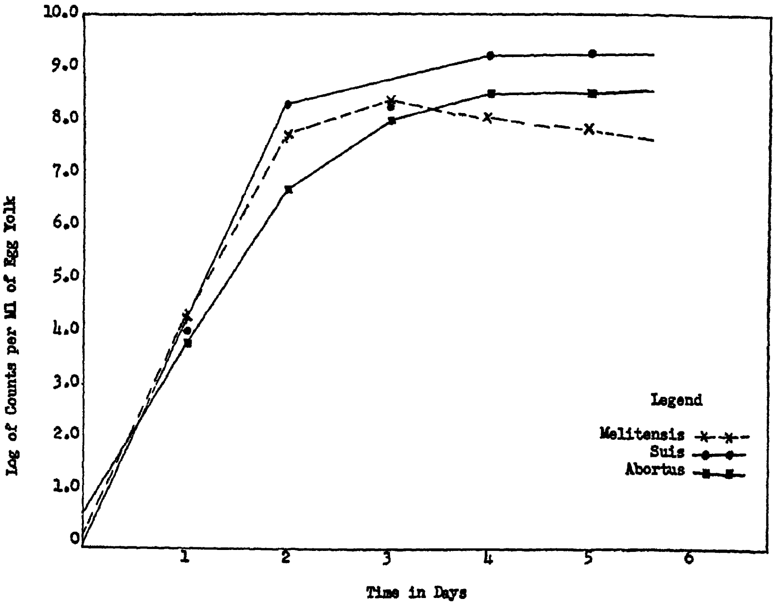

Figure 2. Curves showing multiplication of the three *Brucella* types when injected into yolk sacs of 5-day-old embryos.

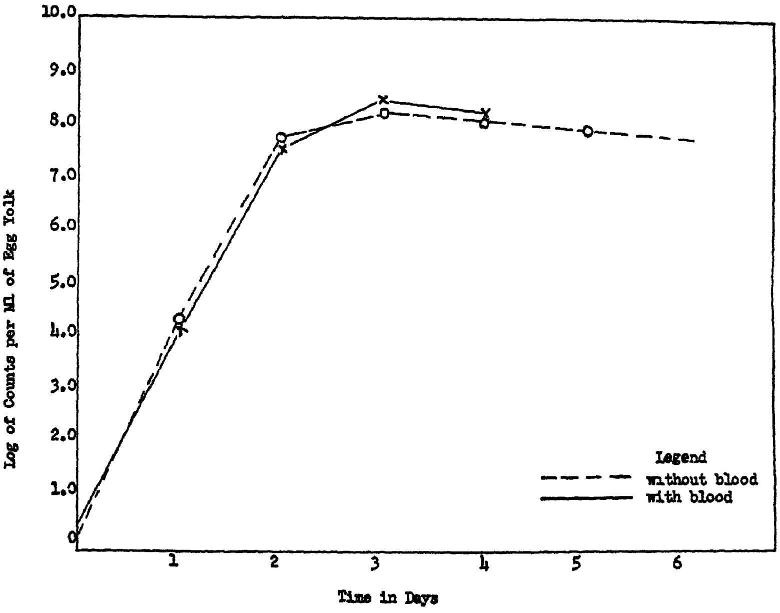

Figure 3. Curves showing multiplication of *Br. melitensis* when injected with blood into yolk sacs of 5-day-old embryos.

practically identical with the one plotted as the standard curve for the *melitensis* strain when injected into 5-day-old eggs.

Discussion

Throughout many experiments conducted prior to and following this series, the results have been amazingly consistent when the standard inoculum was injected into 5-day-old chick embryos. This uniformity has not always been observed when the injections were made at any of the other ages which have been studied. Thus, when a few *melitensis* organisms were injected into the yolk sacs of 1- or 2-day-old embryos, it was observed frequently that multiplication apparently failed to occur, since even after 8 or 9 days further incubation growth was not detected in the yolk material of some of these eggs. On the other hand, when as few as 1 to 10 organisms have been injected into the 5-day embryos, growth has consistently occurred.

It has been interesting to speculate concerning this variation and several explanations have seemed plausible. At first it was thought that perhaps the inoculum was not properly placed within the yolk area. However, since the exact location of the yolk was carefully determined prior to injection and the technique varied according to the age of the embryo, this explanation seemed inadequate. Second, there is the physical difference in the yolk at the various stages of embryonic development. During the first 48 hours it remains quite viscid. On the third day of incubation it begins to enlarge and become more fluid and by the fifth day is quite liquid. It would seem that the more viscid the yolk the slower the dissemination of multiplying bacteria from the original point of injection, and if such is the case, then an examination of the yolk during the first few days may or may not reveal growth, depending upon the age of the embryo and the degree of approximation of the 0.1 ml. aliquot of yolk examined to the original point of injection. However, this condition does not account for the fact that at times the inoculum is never recovered from the yolk of those eggs which had 1- or 2-day embryos at the time of the injection.

Beveridge and Burnet (*6*), in their review of the literature concerned with egg techniques, quote several authors who have studied the presence of antibody and natural resistance in the yolk of the hen egg. This work indicates that the freshly laid egg contains factors of resistance hereditarily acquired. Surely, it is conceivable that the presence or absence of inherent resistance may be a factor in the isolation of *Brucella* when the inoculation is made into the yolk sac. At any rate, observations made during the course of this study indicate that 1- and 2-day old chick embryos may have some resistance to small inocula of *Br. melitensis*.

As has been previously stated, the sole aim of this series of experiments has been to provide a basis for the selection of an appropriate age of embryo for further study in an attempt to adapt egg techniques to the isolation of *Brucella* from the blood stream. Consequently, the 5-day-old embryo has been selected as having reached that stage of development probably offering the most favorable environment for the isolation of *Brucella,* with the 3-, 4- and 6-day embryos offering possibilities, whereas the 1- and 2-day embryos appeared definitely less desirable. It is presumed that if a given age of embryonic development is unfavorable to the multiplication of small numbers of a laboratory strain of *Brucella,* then it will also be unsatisfactory for the original isolation of this organism from the blood stream.

Summary

1. Relative growth curves for a strain of *Br. melitensis*, when injected in small numbers into the yolk sacs of 1- to 6-day-old chick embryos have been presented and the variations resulting from the inoculation of 1- and 2-day embryos noted.

2. Growth curves obtained when this *melitensis* strain was inoculated into 5-day chick embryos and when a *suis* and an *abortus* strain were likewise injected were found to be comparable.

3. As a result of observations made during this study, the 5-day-old embryo has been selected as having reached that age which appears to offer optimum conditions for recovering *Brucella* from the blood stream because (1) it has given the most consistent results throughout these experiments, (2) it is an age easily adaptable to a routine procedure and (3) it affords a fairly long period for the enrichment of slow-growing strains before the yolk becomes dehydrated.

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Incidence of Disease

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

Reports from States for Week Ended August 26, 1950

For the current week, new cases of acute poliomyelitis reported in the Nation numbered 1,617, an increase of 128 or 8.6 percent over the 1,489 cases reported last week. This is the fourteenth week of consecutive increase over the preceding week, beginning with the week ended May 27. During this period increases over the preceding week ranged from a high of 57 percent for the week ended June 10 to 3 percent last week. The rate of increase has slackened in recent weeks.

The cumulative total (10,712) for the current "disease" year was below the corresponding total (19,616) for last year, the highest on record. The "disease" year for acute poliomyelitis begins with the

Comparative Data for Cases of Specified Reportable Diseases: United States

[Numbers after diseases are International List numbers, 1948 revision]

Disease	Total for week ended		5-year median 1945–49	Seasonal low week	Cumulative total since seasonal low week		5-year median 1944–45 through 1948–49	Cumulative total for calendar year		5-year median 1945–49
	Aug. 26, 1950	Aug. 27, 1949			1949–50	1948–49		1950	1949	
Anthrax (062)	---	----	(1)	(1)	(1)	(1)	(1)	29	38	(1)
Diphtheria (055)	76	112	148	27th	463	698	939	3,591	4,466	7,236
Acute infectious encephalitis (082)	18	38	23	(1)	(1)	(1)	(1)	531	417	349
Influenza (480–483)	675	566	602	30th	3,024	2,239	2,239	240,283	78,106	141,816
Measles (085)	826	613	694	35th	306,600	640,310	585,484	287,470	587,947	550,538
Meningococcal meningitis (057.0)	38	39	49	37th	[2] 3,594	3,225	3,496	[3] 2,681	2,381	2,524
Pneumonia (490–493)	673	870	----	(1)	(1)	(1)	(1)	61,362	58,594	----
Acute poliomyelitis (080)	1,617	3,241	1,412	11th	[3] 10,712	19,616	10,187	[3] 11,846	20,531	10,654
Rocky Mountain spotted fever (104)	21	27	27	(1)	(1)	(1)	(1)	369	468	434
Scarlet fever (050)	263	226	370	32d	502	444	747	40,672	58,110	62,850
Smallpox (084)	------	------	1	35th	[2] 46	51	201	[3] 26	41	147
Tularemia (059)	21	24	14	(1)	(1)	(1)	(1)	663	823	686
Typhoid and paratyphoid fever [4] (040, 041)	121	110	138	11th	1,725	2,058	2,058	2,235	2,546	2,546
Whooping cough (056)	1,918	1,403	1,789	39th	109,859	49,624	92,350	88,323	39,591	66,332

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[1] Not computed.

[2] Additions: Meningitis, Oklahoma, week ended Aug. 19, 1 case; smallpox, Mississippi, week ended Aug. 19, 1 case

[3] Deductions: New Jersey and Michigan, week ended Aug. 12, 1 case each

[4] Including cases reported as salmonellosis.

twelfth week of the calendar year. The cumulative total for the calendar year was 11,846, compared with the total of 20,531 for the corresponding period last year.

For the current week, total numbers of reported cases of poliomyelitis in 7 of the 9 geographic divisions increased over the preceding week. These increases ranged from 60 (320 to 380) cases reported in the East North Central States to 1 (154 to 155) case in the West North Central States. The 2 divisions reporting decreases over the preceding week were the East South Central States (120 to 109) and the West South Central States (170 to 166).

For the current week, 25 States reported increases in poliomyelitis over the preceding week. These increases ranged from 42 (21 to 63) in Wisconsin to 1 in Vermont. Other increases were noted in Connecticut (12 to 33), West Virginia (17 to 35), and California (63 to 80).

The total number of cases of whooping cough reported for the week was 1,918 compared with 1,403 for the corresponding period last year. For the calendar year, a total of 88,323 cases was reported, compared with 39,591 for the corresponding period last year.

Of 42 States and the District of Columbia reporting on rabies in animals, 21 States and the District of Columbia reported no cases. The remaining 21 States reported 106 cases. This total includes 26 cases reported in New York, 20 cases reported in Texas, and 8 cases each reported in Iowa and Tennessee.

No smallpox was reported in the United States. The Arizona State Health Department reported a case of bubonic plague. This has been previously reported as a positive laboratory test by the New Mexico State Health Department.

Deaths During Week Ended August 26, 1950

	Week ended August 26, 1950	*Corresponding week, 1949*
Data for 94 large cities of the United States:		
Total deaths	8, 245	8, 060
Median for 3 prior years	8, 418	-----------
Total deaths, first 34 weeks of year	315, 437	315, 874
Deaths under 1 year of age	600	649
Median for 3 prior years	705	-----------
Deaths under 1 year of age, first 34 weeks of year	21, 102	22, 284
Data from industrial insurance companies:		
Policies in force	69, 642, 619	70, 222, 284
Number of death claims	10, 702	12, 617
Death claims per 1,000 policies in force, annual rate	8. 0	9. 4
Death claims per 1,000 policies, first 34 weeks of years, annual rate	9. 5	9. 4

Reported Cases of Selected Communicable Diseases: United States, Week Ended Aug. 26, 1950

[Numbers under diseases are International List numbers, 1948 revision]

Area	Diphtheria (055)	Encephalitis, infectious (082)	Influenza (480–483)	Measles (085)	Meningitis, meningococcal (057.0)	Pneumonia (490–493)	Poliomyelitis (080)
United States	76	18	675	826	38	673	1,617
New England	1	2		72		30	59
Maine						2	1
New Hampshire							2
Vermont				2			3
Massachusetts	1	1		58			19
Rhode Island				2		1	1
Connecticut		1		10		27	33
Middle Atlantic	4	2	1	201	8	154	314
New York	3		[1] 1	68	4	99	184
New Jersey		2		72	3	21	53
Pennsylvania	1			61	1	34	77
East North Central	4	2	21	202	4	113	380
Ohio	1			47	2		86
Indiana	1	1		4		7	23
Illinois	2		3	44	1	75	113
Michigan				24		25	95
Wisconsin		1	18	83	1	6	63
West North Central	2		7	33	4	19	155
Minnesota				11	1	5	27
Iowa				2			54
Missouri	1			10	2	4	7
North Dakota			1	3		7	5
South Dakota				1			7
Nebraska			6	2	1		22
Kansas	1			4		3	33
South Atlantic	24	1	87	26	6	76	271
Delaware				1			2
Maryland	1	1	2	7	1	26	33
District of Columbia				2		10	10
Virginia	3		79	5	1	21	67
West Virginia	4		4	3	1	1	35
North Carolina	10			2	2		65
South Carolina	3			1	1	1	27
Georgia	3		1	1		6	23
Florida			1	4		11	9
East South Central	15	1	25	28	6	55	109
Kentucky	2	1		1	2		36
Tennessee			15	19	3		35
Alabama	3		8	3	1	47	15
Mississippi	10		2	5		8	23
West South Central	20	2	431	77	7	177	166
Arkansas	3		26	1	1	27	14
Louisiana	2			1	2	36	17
Oklahoma		1	12	2	1	8	22
Texas	15	1	393	73	3	106	113
Mountain	3	1	86	62	2	21	34
Montana			24	2	2		6
Idaho	2		1	14			2
Wyoming				3			2
Colorado			38	27		8	9
New Mexico			2	1		6	4
Arizona	1	1	21	7		6	6
Utah				8		1	3
Nevada							2
Pacific	3	7	17	125	1	28	129
Washington	1			8			34
Oregon			14	8	1	6	15
California	2	7	3	109		22	80
Alaska						1	1
Hawaii			15	2			

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[1] New York City only.

Reported Cases of Selected Communicable Diseases: United States, Week Ended Aug. 26, 1950—Continued

[Numbers under diseases are International List numbers, 1918 revision]

Area	Rocky Mountain spotted fever (104)	Scarlet fever (050)	Smallpox (084)	Tularemia (059)	Typhoid and paratyphoid fever[1] (040, 041)	Whooping cough (056)	Rabies in animals
United States	**21**	**263**		**21**	**121**	**1,918**	**106**
New England		**21**			**6**	**235**	
Maine		1				19	
New Hampshire						4	
Vermont						56	
Massachusetts		17			6	60	
Rhode Island		1				62	
Connecticut		2				34	
Middle Atlantic	**1**	**39**			**11**	**320**	**29**
New York	1	[2] 26			2	113	26
New Jersey		3				77	
Pennsylvania		10			9	130	3
East North Central		**77**		**2**	**14**	**490**	**15**
Ohio		26			1	84	6
Indiana		8		2	3	27	6
Illinois		12			5	50	1
Michigan		17			2	181	2
Wisconsin		14			3	148	
West North Central		**14**			**1**	**123**	**10**
Minnesota		1				16	
Iowa						25	8
Missouri		1			1	25	
North Dakota		3				13	
South Dakota		1					
Nebraska		6				5	
Kansas		2				39	2
South Atlantic	**13**	**41**		**6**	**17**	**229**	**16**
Delaware					2	3	
Maryland	6	2				20	
District of Columbia		1				15	
Virginia	2	5		2	5	28	1
West Virginia		1			3	42	4
North Carolina	5	22		1		88	
South Carolina		6		1	1	6	6
Georgia		4		2	5	22	5
Florida					1	5	
East South Central	**2**	**37**		**3**	**22**	**82**	**12**
Kentucky	1	8		1	6	7	1
Tennessee	1	17		1	11	52	8
Alabama		6			4	13	2
Mississippi		6		1	1	10	1
West South Central	**3**	**12**		**7**	**31**	**243**	**22**
Arkansas	2	4		5	7	24	1
Louisiana				2	5	8	
Oklahoma	1	2			7	12	1
Texas		6			12	199	20
Mountain	**2**	**5**		**3**	**3**	**78**	**1**
Montana						17	
Idaho		1			1	14	
Wyoming		1		3		2	
Colorado		2				4	
New Mexico	1				1	12	
Arizona					1	27	1
Utah	1	1				2	
Nevada							
Pacific		**17**			**16**	**118**	**1**
Washington		2			1	41	
Oregon		2				7	
California		13			15	70	1
Alaska						4	
Hawaii						1	

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[1] Including cases reported as salmonellosis.
[2] Including cases reported as streptococcal sore throat.

FOREIGN REPORTS

CANADA

Reported Cases of Certain Diseases—Week Ended Aug. 5, 1950

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Brucellosis						1	4				5
Chickenpox			16		51	65	28	9	28	38	235
Diphtheria	11				2						13
Dysentery:											
Amebic						1					1
Bacillary					5		2			3	10
Encephalitis, infectious								1			1
German measles	1				4	63			2	9	79
Influenza			20				1				21
Measles	1		2		99	197	16	10	8	31	364
Meningitis, meningococcal			1		1						2
Mumps	1		14		49	73	2	7	42	24	212
Poliomyelitis			1		3	15		4	7	6	36
Scarlet fever			1		20	7	4	1	11	4	48
Tuberculosis (all forms)	12		8	27	160	21	22	17	8	18	293
Typhoid and paratyphoid fever					3	1					4
Venereal diseases:											
Gonorrhea	3		13	9	111	66	28	13	46	75	364
Syphilis	4	1	12	10	44	15	3	8	3	15	115
Whooping cough	1		7	2	95	42	10	2	1	18	178

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

Burma. During the week ended August 5, 1950, 44 cases of cholera, with 30 deaths, were reported.

India (French). During the week ended August 12, 1950, 71 cases of cholera were reported in Pondicherry.

Plague

Burma. On June 17, 1950, 1 case of plague was reported in the port of Bhamo.

Indochina. During the week ended August 12, 1950, 5 cases of plague (2 deaths) were reported in Viet Nam, including 3 cases, 1 death, in Phanthiet.

Smallpox

India (Portuguese). For the week ended July 8, 1950, 5 cases of smallpox were reported.

Indonesia. During the week ended August 5, 1950, 260 cases of smallpox were reported in Surabaya and 25 cases in Jogjakarta, Java, and 30 cases were reported in Pontianak, Borneo. For the week ended August 12, 178 cases were reported in Surabaya.

Mozambique. During the week ended July 8, 1950, 18 cases of smallpox, with 2 deaths, were reported.

Peru. For the month of April 1950, 356 cases of smallpox were reported.

Typhus Fever

Peru. During the month of April 1950, 150 cases of typhus fever were reported.

Yellow Fever

Gold Coast. Suspected yellow fever has been reported as follows: On July 16, 1950, one case in Bogoso; on July 28, one death in the port of Accra.

Nigeria. One fatal case of yellow fever, imported, has been reported in Calabar. This case occurred in a seaman on a vessel bound from Dakar to Liverpool via Lagos, Burutu, and Abonema. The patient was landed at Calabar on July 30, and died on August 6.

Sierra Leone. During the period August 1–8, 1950, one fatal suspected case of yellow fever was reported at Pendembu in Kailahun District.

The suspected case reported in Koinadugu District June 24–25 (see PUBLIC HEALTH REPORTS for August 4, 1950, p. 1,001) was not confirmed.

Bubonic Plague in Arizona and New Mexico

Arizona

The case of bubonic plague at Fort Defiance, Arizona reported in the August 25 issue of PUBLIC HEALTH REPORTS, Vol. 65, No. 34, p. 1110, was confirmed by telegram dated August 29, 1950, from the Arizona Department of Health. No details were given concerning the locality of infection.

New Mexico

A report of bubonic plague was made in PUBLIC HEALTH REPORTS, Vol. 65, No. 30, p. 962, giving Pecos, San Miguel County, as the locality of the case. This was the place of death. Later reports state that the patient lived on a ranch near Glorieta in Santa Fe County.

Psychiatrists Posts in New York State

New York State is looking for candidates to fill more than 50 posts as supervising psychiatrist in State mental hospitals. The starting salary is $6,490 with five annual increases up to $7,935.

Applications may be filed up to September 29 for an open competitive examination to be held November 4, 1950, by the New York State Department of Civil Service. The examination will be conducted at about 40 centers in New York State and at other locations to accommodate out-of-State applicants.

Although New York State residence and United States citizenship are usually required of applicants for civil-service positions, in this case both requirements have been waived, except for a few jobs in institutions for the criminally insane to which only citizens may be appointed.

Candidates must have completed 2 years of residency in psychiatry in an approved hospital and 2 years of experience as a member of the staff of a psychiatric hospital, or a satisfactory equivalent. They must also be eligible to enter the examination for a license to practice medicine in New York State.

Complete details and application blanks may be obtained from the New York State Department of Civil Service, Albany.

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The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

The Public Health Reports, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

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FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
G. St. J. Perrott, Chief of Division

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Public Health Reports

Vol. 65 • SEPTEMBER 22, 1950 • *No. 38*

Why Cancer "Control"?

By RAYMOND F. KAISER, M.D.*

In the last decade there has been a tremendous upsweep of public interest in cancer and an increasingly voiced demand that the disease be brought under control. Why? Almost everyone has friends, acquaintances or relatives who have died of cancer. These personal experiences, plus the effect of the wide publicity of the fact that cancer is the second highest cause of death, have made most people aware that cancer is a common cause of death and that the disease is a serious health problem. The publicity given over a number of years to the total number of individuals dying annually of cancer has further impressed the public with the extent and seriousness of the disease. The cancer movement has gained such momentum that the public in general recognizes and accepts cancer as a major health problem.

With cancer established as a health problem, the question arises as to whether it can be considered a public health problem. When does a health problem become a public health problem? According to Mustard, this transition occurs when a health problem, because of its nature and extent, may be solved only by systematized social action. "When, or if, a given problem of health and disease can no longer be solved by the unassisted effort of the citizen and the uncoordinated resources of the community" (*1*) then it becomes a public health problem.

With the control of the communicable diseases, industrialization, increasing urbanization, and the aging of the population, there has come about a reversal in the relationship of disease problems associated with the diseases of children and young adult life as compared with those diseases associated with maturity (*2*). Formerly, this latter group of diseases was of relatively minor public health significance when compared with the disease problems of younger life. Today, the group of disease problems associated with adult life has become the dominant problem of public health. Of this disease group, due to the widespread public interest in the disease, the extent and nature of this disease and its effect on the Nation's people, individually and collectively, cancer has assumed a position of significance heretofore overshadowed and unrecognized in the traditional fields of public health activities

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In part this is due to the extent of the problem—approximately 200,000 deaths a year in this Nation are due to cancer, and cancer accounts for 14 percent of deaths from all causes. Reduced to more tangible terms this means that in an average American community with a population of 10,000 people approximately 100 will die during the course of a year. Of these deaths, 14 will be due to cancer. During the same year, approximately 40 individuals will develop the disease. Of this number, all will die if the cancer goes untreated. This, then, from a community standpoint, is a disease of major concern.

Cancer as a public health problem is important only as the suffering of the individual is important to the community as a whole. Few diseases affect family life in the manner cancer does—it hits the individual usually at the height of his productive period, when he has heavy family responsibilities, and disrupts family activities. The disease creates a tremendous strain on the family finances, plus a strain on the family group because of the prolonged nature of the disease. With cancer one has the problem of a sick person, needing specialized care, creating a heavy financial burden which the individual, in a large number of instances, is not able to bear himself. As a consequence, care of the cancer patient must be regarded as a community problem. As more and more people reach maturity this will become an increasingly heavy burden. The care of cancer patients is obviously a humanitarian venture. With the increasing interest of the public in the problem, it may well be that the public will assume this common responsibility as contrasted to individual responsibility for care of the cancer patient as it has done for certain other diseases (care of the insane and tuberculous) and for certain groups of the population (care of the indigent). Irrespective of the outcome in this regard, it cannot be denied that cancer is of considerable significance when viewed from a socioeconomic standpoint.

The cancer death rate shows a sharp increase at approximately 40 years of age and rises precipitously thereafter. It is essentially a disease associated with maturity and adult life. Most assuredly, humans must die of something and it may be that deaths of unproductive older persons, from a sociologic and biologic standpoint, are a less serious matter than a similar number of deaths of the young. However, now that efforts directed toward the extension of the average human life span have been successful, with a resultant increase in man's productive years, can the product of these endeavors be ignored and all efforts to further man's status in relation to these diseases, specifically cancer, be abandoned? Obviously not—so one sees that even from a philosophic standpoint cancer is significant.

When one considers that cancer often strikes the individual at the height of his productive years, it becomes apparent that the disease can produce a considerable disruption in family life and a tremendous economic loss to the individual. Drolet, in a recent review of all causes of death in New York City, (*3*) pointed out that cancer is responsible for a greater loss of working time among women than any other disease. To arrive at an estimate of the relative value of life at various ages would be extremely difficult and quite arbitrary. However, it is obvious that by reducing cancer mortality the economic structure of the Nation would be enhanced.

A reduction in mortality of a given disease and its prevention are two of the basic elements of a program to control any disease. The current concept of cancer control embraces both of these premises. The extension of available knowledge of cancer and its diligent application makes possible the control of the disease in these senses. It is unnecessary to await the discovery of the cause of cancer to accomplish a considerable degree of control over the disease.

Today it is known that a number of cancers are initiated by exposure to various environmental or exogenous agents, usually over an extended period of time. All such cancers definitely belong in the class of preventable diseases in the strict sense of the term. Much can be done in preventing those cancers due to various industrial and occupational hazards through the application of corrective measures which reduce or eliminate the exposure. Such an activity is a function of cancer control.

One of the precepts of cancer control is to reduce the mortality due to the disease. How can this be accomplished? As in the control of any other disease, by the application of available knowledge concerning cancer through preventive, medical, and educational services. A cancer educational program for the public should remove from the public mind the misconception that cancer is an incurable disease with associated prolonged suffering and pain, through the publication of factual data about cancer which are applicable to the development of a reasonable mental attitude toward the disease.

The mental attitude of every individual toward cancer is an important factor in the control of the disease and every cancer educational program directed to the public should take cognizance of this fact. It would accomplish little to establish in the public mind a fear of the disease which would lead to an emotional response in which the individual is so afraid of the disease he will not even look for signs of cancer and will not act if he becomes aware of it. In like manner, such a program should not promote the development of an "It can't happen to me" or a fatalistic attitude. Neither of these responses need result from a cancer educational program. It is possible to design a program of such a nature that it would lead to the creation of a common sense attitude toward the problem, in which the informed individual would give more than a casual thought to the possibility of the disease, be on the alert to possible signs of the disease, and, if evidence of the disease is found, be motivated to seek attention at the earliest opportunity. Such an attitude will accomplish much toward the control of cancer and will be a determining factor as to whether we continue to have 200,000 and more deaths annually from this disease.

However, there is one significant difference between cancer "control" and other disease control, a difference which provides justification for emphasis on cancer control above and beyond other disease conditions. This difference is that with cancer the speed with which medical services are efficiently utilized is a measure of the life expectancy of the individual. Prompt action is the absolute prerequisite to survival. Consequently, the reduction of the delay period between onset of the disease, diagnosis of the condition, and initiation of treatment is one of the major responsibilities of cancer control.

The control of cancer further differs from other disease control programs in the fact that there is no simple test to determine its presence, that in the early stages its symptoms are obscure and difficult to assess and that treatment, to be effective, requires diagnosis in the earliest stages of the disease.

Since cancer is often symptomless in its initial and most curable stage, diagnosis usually starts in the family physician's office where, frequently, if the physician is alert to cancer, indications of its existence may be picked up while the patient is being examined for other conditions. The nature and obscurity of the disease, therefore, places the responsibility for its initial diagnosis in the hands of general practitioners throughout the Nation.

The publicity which has been given to the disease tends to leave in the public mind the erroneous impression that physicians see a tremendous amount of cancer in their daily practices. Actually, such is not the case. In reality, the average general practitioner sees approximately two or three new cases of cancer annually. In view of this situation, there arises the problem, which falls within the province of cancer control, of keeping the physician alerted to cancer and abreast of the latest developments in the diagnosis of the disease.

Since the initial symptoms are vague and may be confused with other conditions, the confirmation of the diagnosis often requires special skills and experience beyond the ability of the average general practitioner as well as costly equipment which, in view of the small number of cases he sees, the average practitioner could not reasonably be expected to maintain as part of his general diagnostic armamentarium.

So it is that the very obscurity of the disease places the initial steps for its diagnosis within the province of the general practitioner; sets the further requirement that confirmation of diagnosis must often be made by physicians particularly skilled in the field of cancer diagnosis. This is commonly achieved by operating group centers of concentrated diagnostic activity, such as cancer clinics. Thus, from the nature of the disease and the requirements for its diagnosis it can be seen that the development and strategic distribution of adequate cancer services and facilities, and bringing these within the reach of a larger segment of the population, is one of the major responsibilities of cancer control. The funds required for the expansion of existing diagnostic services and the initiation of such services where they are nonexistent is so great the problem becomes one for community action. In encompassing the provision of such services, cancer control bridges the field between preventive and curative medicine, bringing the two fields closer together.

Since diagnosis proper starts in the physician's office, it is necessary to encourage the public to seek medical attention through a widespread educational program which outlines the nature and significance of initial symptoms of the disease which might indicate cancer and stresses the importance of immediate physical examination. Public education as to the nature and significance of cancer is a prerequisite of cancer control.

Through such a program, both the prospective patient and the physician share in the responsibility for discovering cancer in its earliest stage. It is the patient's responsibility to watch for those signs of cancer which can be seen or felt and, if he notes them, to go immediately to a physician. This applies to the discovery of external cancer, since the body surface is easily inspected and examined by the individual, and is particularly applicable to the discovery of breast cancer, since it has been shown that in the majority of such cases the woman herself first finds the mass in her breast. The key to the control of breast cancer lies in the hands of women themselves.

One out of five cancer deaths is due to breast cancer. Many of these deaths can be prevented through a community-wide educational program which offers women instruction in breast self-examination and encourages them to carry out such an examination procedure at monthly intervals. Such an educational measure offers real possibilities for the control of a large number of breast cancers.

Today internal cancer requires the most extensive and costly examination procedure and, in the absence of simple screening techniques, its discovery must remain the sole responsibility of professional groups skilled in cancer diagnosis.

The control of cancer is dependent upon an adequate supply of medical personnel, trained in techniques of cancer diagnosis and treatment. In order that the quality and availability of cancer services may be raised, cancer control must concern itself with the provision of such training.

By virtue of the fact that there is not available at the present time knowledge sufficient to assure complete mass prevention of the onset of cancer and there is not a diagnostic test or screening device which is susceptible to mass application, the control of the disease is based upon early recognition, adequate, accurate methods of examination and effective treatment. To accomplish this requires the simultaneous and coordinated efforts of physicians in many special fields of medicine (pathology, surgery, radiology, internal medicine, etc.) most of whom function outside the traditional public health program. In view of these circumstances, it is quite clear that official health agencies are not yet in a position to be solely responsible for the control of the disease, but must share this responsibility with the medical profession, research and teaching institutions, community hospitals, voluntary agencies, etc. Cancer control is, therefore, a problem of integration, bringing current knowledge of the disease to the ultimate point of application—the cancer patient.

Lastly, cancer control complements but does not supplant the extensive research programs now under way which are so essential if we are to develop a completely acceptable control program. Cancer control translates the findings of investigations and brings about their effective application. Control measures cannot, therefore, be separated from research. In fact, experience indicates clearly that they cannot be successfully separated, but are mutually so closely related that for optimal results in either field, they must be suitably integrated.

In summary, the control of cancer is a significant public health problem which necessitates group action. Today there is available scientific knowledge for the prevention and control of cancer which can be put to practical use; in general, the medical profession is favorably inclined toward the application of this knowledge; there exists a favorable attitude on the part of the public to control of the disease; and funds sufficient to make an initial effort toward cancer control are available. By utilizing the leadership of health agencies in bringing together the many groups and agencies vitally concerned with the cancer problem, it is possible to make substantial headway in controlling the disease. The extent of the cancer problem is so great that even halfway measures will save more lives than would be saved by complete control of many less widespread diseases.

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Trends in Age Distribution of Diphtheria in the United States

By C. C. Dauer, M.D.*

In spite of the marked decline in diphtheria morbidity and mortality in the United States for several decades which has amounted to more than 90 percent since 1915, certain aspects of its occurrence deserve further study. In the past decade an increasing proportion of cases in the older age groups has been noted and some have said that this represents an absolute as well as a relative increase in diphtheria in adults.

The present study has been carried out for the purpose of determining the validity of the statement that diphtheria is actually becoming more common in adults. It was felt that a study of the trends of both morbidity and mortality by age groups over a period of years in certain States and cities would give a fairly accurate estimate of such a change if one actually has occurred. Only a limited number of States and cities have published, or have available, tabulations of reported cases of diphtheria by age groups for a sufficiently long period of time to permit a study of trends. Those with data covering a period of 20 years or more include five northern States, three of which have a high proportion of urban population (Massachusetts, Connecticut, and New Jersey) and two which are predominantly rural (Minnesota and Kansas). Two are typical southern States (North Carolina and Alabama) and one borderline (Maryland). In addition to these, data are available for one western State (California) and for two cities, the District of Columbia and Baltimore. The trend of distribution in upper New York State has been reported by Ingraham and Korns (*1*) and is not repeated here.

The 5-year period ending in 1944 was made the endpoint of the study because there are no dependable estimates of populations by age groups since the 1940 census. No separation was made of cases and deaths by race except for Alabama. Data for Maryland, used in this study, are exclusive of Baltimore. When calculating morbidity rates, all cases of unknown age were distributed according to the percentage distribution of cases of known age. In this report the trend of morbidity and mortality will be emphasized more than any differences in rates in one State as compared with another.

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Percentage Distribution of Cases and Deaths

The proportion of cases and deaths from diphtheria by age groups, as shown in table 1 and figure 1 indicate that variable degrees of change in distribution have occurred in the past two or more decades. In some States, such as Massachusetts, there has been a slight increase in proportion of cases in the group 20 years of age and over, with a correspondingly small decrease in the 5- to 9-year group and little change in the under 5-year and in the 10- to 19-year groups. In New Jersey there was a decrease in percentage of cases in the groups 5 to 9 years of age and an increase in the 10- to 19-year group but little change in the groups under 5 years and 20 years and over. In Minnesota, Kansas and California there was a more pronounced increase in proportion of cases in the group 20 years of age and older and a corresponding amount of decrease in the 5- to 9-year group. In the southern States and in the District of Columbia, the trend has been in the direction of a slightly greater proportion of diphtheria cases in the group under 5 years and a decrease in the group 20 years of age and older. Ingraham and Korns reported "relatively little change in age distribution of cases" in upstate New York from 1918 to 1946.

The wide difference in distribution of diphtheria cases by age in the urban and rural sections of the northern States, emphasized by Godfrey (*2*) more than 20 years ago, has remained constant. The continued large proportion of cases under 10 years in such States as

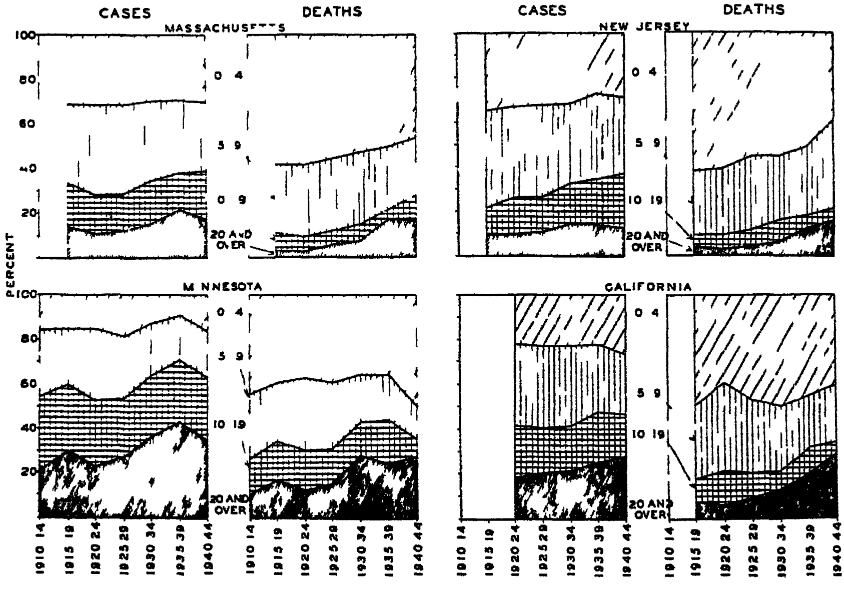

Figure 1. Percentage of diphtheria cases and deaths in four States, 1910–44.

Table 1. *Percentage distribution of diphtheria cases and deaths by age groups*

Place	Period	Cases				Period	Deaths			
		Under 5	5-9	10-19	20 and over		Under 5	5-9	10-19	20 and over
Massachusetts	1918-19	30.8	36.0	19.7	13.4	1915-19	57.8	30.5	7.7	3.9
	1920-24	31.3	40.1	17.8	10.7	1920-24	58.1	31.9	6.5	3.4
	1925-29	31.5	39.4	16.5	12.4	1925-29	55.3	32.9	6.3	5.4
	1930-34	29.4	36.3	18.7	15.6	1930-34	51.9	32.4	7.5	8.1
	1935-39	29.1	32.4	15.8	22.7	1935-39	50.0	25.1	4.4	17.5
	1940-44	29.8	31.2	21.1	17.9	1940-44	46.9	24.5	12.2	16.3
Connecticut	1915-19					1915-19	60.5	27.6	7.2	4.6
	1921-24	29.3	38.7	17.4	14.5	1920-24	58.2	30.4	7.3	4.0
	1925-29	26.8	36.2	20.9	15.9	1925-29	49.2	33.4	10.9	6.3
	1930-34	29.1	29.5	19.8	21.5	1930-34	49.4	23.6	13.5	13.5
	1935-39	23.6	35.9	22.5	17.9	1935-39	39.1	39.1	12.5	9.4
	1940-44	25.5	24.2	25.5	24.8	1940-44	83.3	0	0	16.6
New Jersey	1916-19	34.7	39.1	12.3	9.6	1915-19	61.9	28.7	5.8	3.5
	1920-24	33.7	39.5	16.9	9.9	1920-24	60.9	29.6	6.8	2.7
	1925-29	33.2	40.2	16.0	10.5	1925-29	55.7	33.0	6.9	4.3
	1930-34	31.6	36.0	17.9	14.5	1930-34	56.5	27.3	9.7	6.5
	1935-39	27.1	38.3	20.2	14.3	1935-39	50.6	31.0	5.7	12.7
	1940-44	28.6	34.0	24.4	12.9	1940-44	39.3	38.3	5.3	16.1
Minnesota	1910-14	16.3	29.5	33.2	20.9	1910-14	44.2	28.8	16.5	10.4
	1915-19	14.9	25.5	29.5	29.9	1915-19	9.6	26.0	16.9	17.4
	1920-24	15.2	31.9	29.7	23.1	1920-34	37.5	32.2	17.7	12.5
	1925-29	18.6	28.0	25.9	27.5	1925-29	39.0	30.6	15.2	15.2
	1930-34	13.2	22.5	27.4	36.7	1930-34	35.6	20.7	15.5	28.1
	1935-39	8.5	19.9	28.4	43.1	1935-39	35.7	20.0	20.0	24.3
	1940-44	16.8	19.5	28.1	35.6	1940-44	49.2	14.7	8.2	27.9
Kansas	1918-21	17.4	35.7	29.2	17.6	1915-19	49.8	33.1	11.9	5.2
	1920-24					1920-24	49.7	31.9	12.4	5.9
	1925-29	22.5	29.1	21.9	26.4	1925-29	51.4	24.9	12.3	11.3
	1930-34	19.3	34.1	23.4	23.2	1930-34	47.7	32.9	10.5	8.9
	1935-39	20.0	24.6	24.6	30.8	1935-39	47.0	25.0	11.7	16.2
	1940-44	19.7	20.3	23.7	36.2	1940-44	35.2	33.2	16.7	14.8
California	1915-19					1915-19	49.0	33.0	10.1	7.8
	1923-24	21.8	36.9	22.5	18.8	1920-24	39.6	39.3	14.6	6.4
	1925-29	23.1	36.4	20.0	20.4	1925-29	46.7	32.3	10.8	9.4
	1930-34	22.9	35.4	20.0	21.7	1930-34	49.5	28.9	8.4	13.2
	1935-39	22.5	29.9	22.0	25.5	1935-39	44.3	23.4	12.2	20.0
	1940-44	26.7	27.0	19.1	27.2	1940-44	40.2	25.1	5.1	29.4
District of Columbia	1910-14	23.2	31.5	26.2	18.2	1910-14	62.7	27.0	3.4	6.8
	1915-19	18.2	35.1	28.0	18.6	1915-19	50.0	32.4	11.3	6.2
	1920-24	25.8	39.5	22.0	15.6	1920-24	51.8	36.2	7.7	4.1
	1925-29	28.8	39.3	21.3	10.5	1925-29	53.5	27.7	8.2	10.6
	1930-34	34.5	35.1	18.9	11.4	1930-34	63.7	19.6	5.8	10.8
	1935-39	38.5	27.6	14.3	19.6	1935-39	50.0	33.0	10.2	6.8
	1940-44	40.6	28.7	21.3	9.4	1940-44	57.1	42.9	0	0
Baltimore	1908-17	41.4	32.4	14.2	11.9					
	1915-19					1915-19	75.6	17.0	2.7	4.6
	1920-24	51.5	35.7	11.8	10.2	1920-24	73.7	19.4	4.1	2.8
	1925-29	39.9	36.6	11.9	11.6	1925-29	65.2	25.0	5.1	4.7
	1930-34	43.6	33.2	13.2	9.9	1930-34	57.7	28.1	9.9	4.2
	1935-39	23.8	41.3	21.7	13.1	1935-39	48.1	18.5	22.2	11.1
	1940-44	24.9	40.8	19.7	14.5	1940-44	26.1	39.1	17.4	17.4
Maryland excluding Baltimore	1908-17	22.1	32.8	28.4	16.7	--	-			- --
	1915-19					1915-19	53.9	27.2	11.3	7.5
	1918-24	21.5	31.9	27.9	18.7	1920-24	56.5	26.9	10.4	6.1
	1925-29	22.9	32.0	24.5	20.5	1925-29	51.6	36.9	7.6	3.8
	1930-34	18.5	31.3	27.6	22.5	1930-34	45.4	32.9	10.5	11.2
	1935-39	22.4	30.7	24.8	22.0	1935-39	57.6	22.2	10.1	10.1
	1940-44	24.9	40.8	19.7	14.5	1940-44	39.1	32.6	8.7	19.5
North Carolina	1920-24					1920-24	70.8	23.1	4.0	2.1
	1925-29	40.8	34.6	13.6	10.9	1925-29	75.6	19.4	3.0	2.0
	1930-34	44.6	32.5	12.7	10.2	1930-34	77.1	17.3	2.5	3.0
	1935-39	45.4	34.3	12.1	8.1	1935-39	76.5	20.2	1.4	1.8
	1940-44	42.5	35.9	13.8	7.7	1940-44	73.5	19.8	3.3	3.3
Alabama	1925-29	50.4	33.4	9.7	6.5	1925-29	81.7	16.5	1.1	.6
	1930-34	47.3	34.7	11.9	6.1	1930-34	75.1	21.1	1.9	1.7
	1935-39	54.7	29.4	9.5	6.3	1935-39	82.8	12.4	2.3	2.5
	1940-44	59.2	29.0	7.5	4.2	1940-44	85.3	12.4	.9	1.4

Massachusetts and New Jersey, and a contrastingly low proportion in Minnesota in the same age group, are evident in the data shown in figure 1. Part of this difference in distribution in urban and rural areas is probably due to differences in age composition of populations. In table 1 the even greater difference in age distribution in southern as compared with northern States is still evident and has not changed since Doull (*3*) and Fales (*4*) pointed this out many years ago.

In recent years several parts of the United States have experienced an increase in incidence of diphtheria which apparently is a cyclic increase, as Anderson (*5*) has described it. The proportion of reported cases under 5 years increased sharply in Minnesota during the cyclic increase occurring in 1944 and 1945 in that State, and in Baltimore a shift toward the same age group was evident in 1945 and 1946 when the incidence increased sharply. California showed no shift in age distribution from 1944 to 1946, inclusive, when an increase of incidence occurred. On the other hand, in Massachusetts and New Jersey, there was an increase in proportion of cases in persons 20 years of age and over when the disease became more prevalent in 1946 and 1947.

The changes in percentage distribution of deaths from diphtheria have followed the trends of cases in the various States except that the proportion of deaths in the older ages, i. e., 20 and over, has become greater, especially in the last two 5-year periods.

Morbidity and Mortality Rates by Age

The trends of morbidity rates per 100,000 population have been very uniform in each of the States as shown in table 2 and figure 2. In these graphs the trend lines have been superimposed as nearly as possible in order to demonstrate the similarity in trends for all of the age groups of each State.

In all of the areas for which data are available prior to the 1920–24 period, morbidity rates increased some time between 1915 and 1924 which represents a periodic increase in incidence characteristic of the disease. Following the 5-year period, 1920–24, the morbidity rates for each of the age groups declined at a fairly rapid rate. The remarkably uniform rate of decrease in the four age groups can be seen in figure 2. The downward trend was most marked in northern States with a preponderance of urban population, somewhat less in rural areas of the same section, and least in the southern States. There has been a slower decline in morbidity in the South in recent years in spite of the fact that a relatively large proportion of children have been immunized as reported by Collins (*6*).

The trend of mortality has been similar in the three age groups under 20, and in most instances the mortality trend lines of the

Table 2. *Mean annual diphtheria morbidity and mortality rates per 100,000 population by age groups*

Place	Period	Cases				Period	Deaths			
		Under 5	5-9	10-19	20 and over		Under 5	5-9	10-19	20 and over
Massachusetts	1918-19	603	790	220	41	1915-19	104.7	59.9	8.2	1.1
	1920-24	693	911	224	35	1920-24	89.8	50.4	5.7	.8
	1925-29	368	431	96	18	1925-29	42.1	23.5	2.4	.5
	1930-34	162	180	46	9.9	1930-34	17.4	9.8	1.1	.3
	1935-39	24	24	5.2	1.9	1935-39	3.7	2.9	.1	.1
	1940-44	16	16	4.4	.9	1940-44	1.6	.8	.2	<.1
Connecticut	----	----	----	----	----	1915-19	91.4	46.1	7.1	1.2
	1921-24	423	765	150	42	1920-34	75.2	43.1	5.6	.8
	1925-29	260	327	97	20	1925-29	32.6	20.5	3.5	.5
	1930-34	77	67	21	6.2	1930-34	6.9	3.0	.8	.2
	1935-39	34	47	12	2.5	1935-39	4.3	4.0	.6	.1
	1940-44	8.4	7.4	3.1	.7	1940-44	.9	0	0	<.1
New Jersey	1916-19	458	550	131	21	1915-19	96.1	47.2	5.5	.9
	1920-24	657	766	185	29	1920-24	94.0	45.5	5.8	.7
	1925-29	508	554	116	21	1925-29	66.6	35.8	3.9	.7
	1930-34	189	188	4.5	10	1930-34	24.0	10.1	1.7	.3
	1935-39	60	73	16	3.0	1935-39	6.0	3.2	.2	.1
	1940-44	24	26	7.4	.9	1940-44	1.7	1.5	.5	<.1
Minnesota	1910-14	175	329	193	42	1910-14	61.8	41.7	12.5	2.7
	1915-19	185	328	206	68	1915-19	37.4	25.7	9.0	3.0
	1920-24	248	524	264	65	1920-24	31.9	27.8	8.3	1.8
	1925-29	173	245	119	40	1925-29	20.0	14.6	3.8	1.2
	1930-34	39	63	38	15	1930-34	4.1	2.2	.9	.4
	1935-39	13	30	20	8.4	1935-39	2.2	1.2	.6	.2
	1940-44	18	22	14	4.8	1940-44	2.6	.8	.2	.2
Kansas	1918-21	357	741	328	64	1915-19	46.7	31.9	6.1	.9
	----	----	----	----	----	1920-24	62.8	40.0	8.3	1.2
	1925-29	123	148	60	22	1925-29	15.6	8.3	2.2	.6
	1930-34	96	153	54	16	1930-34	17.8	11.2	1.8	.5
	1935-39	53	62	29	10	1935-39	8.7	4.4	.9	.4
	1940-44	29	29	15	.6	1940-44	2.8	2.5	.5	.1
California	----	----	----	----	-	1915-19	50.3	34.0	5.7	.9
	1921-24	725	1,154	390	69	1920-24	78.5	73.3	15.0	1.4
	1925-29	318	450	114	29	1925-29	34.2	20.8	3.8	.7
	1930-34	152	214	62	16	1930-34	19.2	10.2	1.5	.6
	1935-39	80	118	39	9.4	1935-39	10.8	5.7	1.3	.4
	1940-44	58	61	18	5.3	1940-44	7.2	4.7	.4	.5
District of Columbia	1910-14	389	550	220	34	1910-14	52.9	23.7	1.4	.6
	1915-19	513	1,003	379	52	1915-19	87.7	54.3	9.7	1.1
	1920-24	546	821	221	31	1920-24	65.1	44.7	4.6	.5
	1925-29	745	951	282	25	1925-29	57.0	27.4	4.2	1.1
	1930-34	493	475	125	14	1930-34	38.1	11.1	1.6	.6
	1935-39	635	473	107	27	1935-39	23.1	15.8	2.1	.3
	1940-44	71	54	16	1.3	1940-44	2.0	1.6	0	0
Baltimore	1908-17	666	593	144	30	----	----	----	----	----
	----	----	----	----	----	1915-19	99.3	23.8	1.9	.9
	1921-24	833	721	128	28	1920-24	93.7	25.2	2.8	.5
	1925-29	572	487	84	21	1925-29	58.7	20.8	2.2	.5
	1930-34	200	136	27	5.2	1930-34	13.1	5.7	1.0	.1
	1935-39	58	94	22	3.2	1935-39	4.5	1.6	.8	.1
	1940-44	45	69	14	2.4	1940-44	2.1	3.1	.5	.1
Maryland exclusive of Baltimore	1908-17	206	305	143	31	----	----	----	----	----
	----	----	----	----	----	1915-19	61.0	29.6	6.6	1.6
	1918-24	265	375	178	41	1920-24	54.1	24.7	5.1	1.0
	1925-29	166	212	89	25	1925-29	23.9	15.6	1.8	.3
	1930-34	149	231	107	28	1930-34	17.2	11.4	1.9	.6
	1935-39	70	92	35	9.4	1935-39	14.1	5.2	1.1	.3
	1940-44	53	90	27	6.0	1940-44	4.4	3.6	.4	.3
North Carolina	----	----	----	----	----	1920-24	71.7	22.9	2.3	.6
	1925-29	377	300	68	25	1925-29	61.3	14.8	1.3	.4
	1930-34	300	201	43	15	1930-34	44.1	9.2	.7	.4
	1935-39	261	190	33	9.3	1935-39	34.0	8.7	.3	.2
	1940-44	122	101	18	4.1	1940-44	14.0	3.7	.3	.1
Alabama (white)	1925-29	397	256	42	12	1925-29	74.5	14.6	.6	.1
	1930-34	362	257	47	9.8	1930-34	56.2	15.3	.8	.3
	1935-39	250	133	21	5.4	1935-39	33.9	5.1	.5	.2
	1940-44	154	75	9.2	1.7	1940-44	19.8	2.9	.1	.1

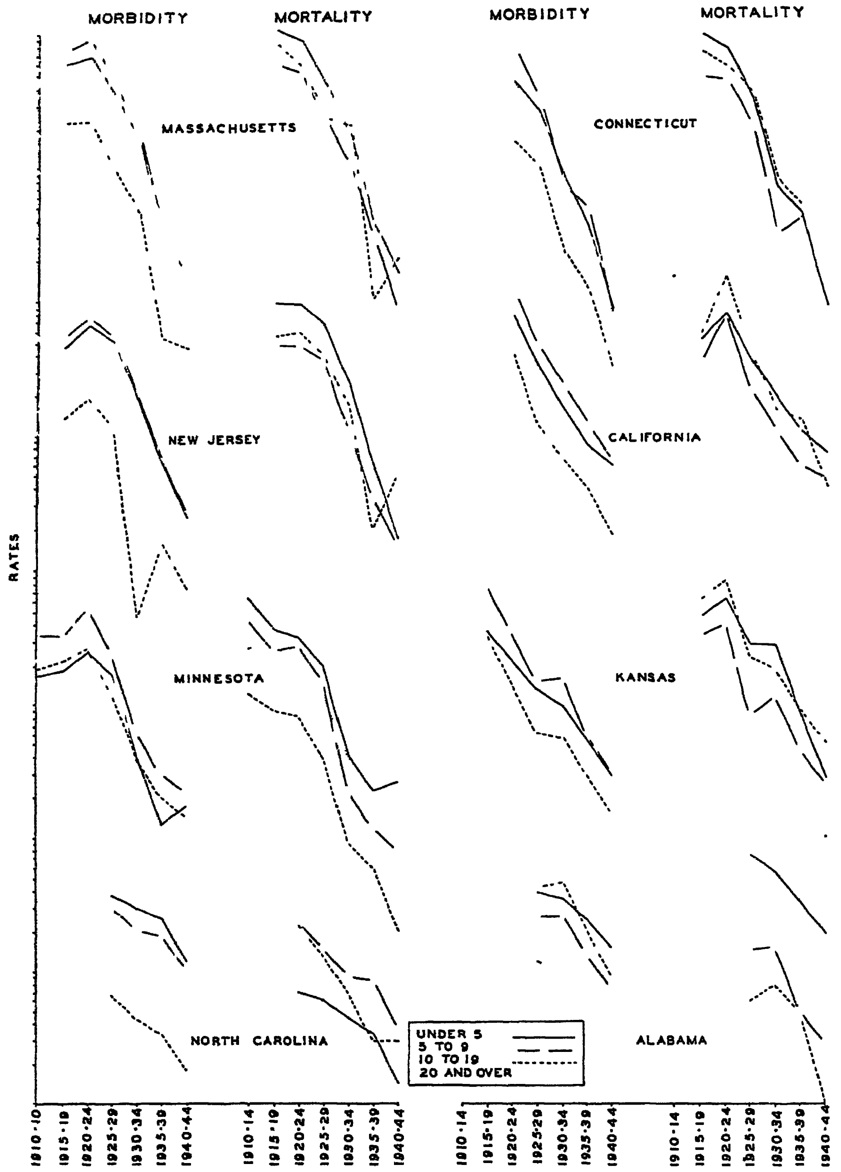

Figure 2. Trend lines of diphtheria morbidity and mortality rates per 100,000 population in eight States, 1910–44. (See table 1 for actual rates.)

younger groups resemble the morbidity trend. In the group 20 years of age and over, mortality has declined more slowly in many States, namely, California, Connecticut, Massachusetts, Maryland, and New Jersey, and likewise in the city of Baltimore. Mortality data which were tabulated for various other States not included in the study because of a lack of morbidity data show that diphtheria mortality declined more slowly in persons 20 years of age and over than in those under 20 in Indiana, Montana, Vermont, Washington, and Wisconsin. This slower decline of mortality in the older age group was not evident in Alabama or North Carolina, nor in other southern States not included in the study, such as Mississippi, South Carolina, and Virginia.

Case Fatality Rates

As indicated in table 3 and figure 3, diphtheria case fatality rates have shown a considerable amount of variation. For instance, in California, Connecticut, and Kansas, the fatality rate in the group under 5 years old has declined very little, while in New Jersey and Baltimore, it has decreased steadily over the years in this age group. However, the most significant change has been a rise in fatality in persons 20 years of age and over in nearly all States.

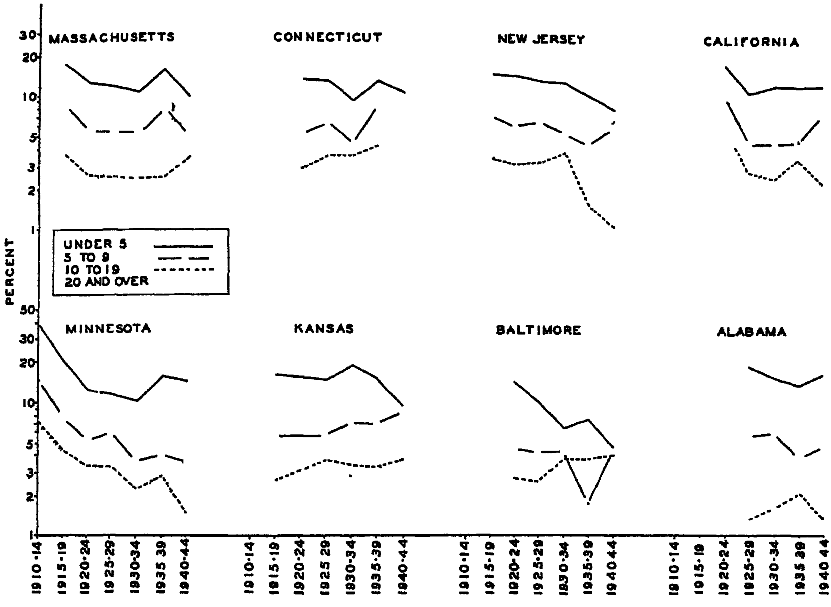

Figure 3. Diphtheria case fatality rates (percent) in eight States, 1910–44.

Comment

The data which have been presented indicate that changes in the percentage distribution of diphtheria cases have not occurred uniformly, although in several States there has been an increase in proportion of reported cases in the age group 20 years old and over. A more pronounced increase in proportion of deaths in the older age group has occurred in northern States but little in the two southern States.

A very rapid decline in diphtheria morbidity rates followed the 1920–24 period in all age groups in the northern States for which data are available; a much less rapid decline occurred in the southern States. Morbidity declined about equally in all age groups in individual States but declined more rapidly in some northern States where urban populations predominate. This difference is not striking.

Table 3. *Diphtheria case fatality rates (percent) by age groups*

Period	Under 5	5–9	10–19	20 and over
MASSACHUSETTS				
1918–19	17.7	8.4	3.7	2.8
1920–24	12.9	5.5	2.6	2.2
1925–29	11.4	5.4	2.5	2.8
1930–34	10.8	5.4	2.4	3.1
1935–39	16.0	8.0	2.5	7.2
1940–44	9.9	5.0	3.6	5.7
NEW JERSEY				
1916–19	15.2	7.1	3.4	3.7
1920–24	14.3	5.9	3.1	2.2
1925–29	13.1	6.4	3.3	3.2
1930–34	12.7	5.3	3.8	3.2
1935–39	10.0	4.3	1.5	4.7
1940–44	7.9	5.9	1.1	6.4
KANSAS				
1918–21	16.7	5.6	2.7	1.6
1925–29	15.1	5.7	3.7	2.8
1930–34	18.4	7.3	3.4	2.9
1935–39	16.3	7.0	3.3	3.6
1940–44	9.4	8.7	3.7	2.1
DISTRICT OF COLUMBIA				
1910–14	13.8	4.4	0.6	1.9
1915–19	17.1	5.7	2.5	2.1
1920–24	11.9	5.4	2.1	1.5
1925–29	9.0	3.2	1.9	3.3
1930–34	7.7	2.3	1.3	3.9
1935–39	3.6	3.3	2.0	.9
1940–44	2.8	2.9	0	0
MARYLAND excluding BALTIMORE				
1920–24	14.8	4.8	2.1	1.8
1925–29	14.4	7.3	1.9	1.2
1930–34	11.5	4.9	1.8	2.3
1935–39	20.2	5.7	3.2	3.6
1940–44	8.4	4.1	1.5	4.8
ALABAMA				
1925–29	18.7	5.7	1.3	1.1
1930–34	15.5	5.9	1.6	2.8
1935–39	13.5	3.8	2.1	3.5
1940–44	16.1	4.8	1.3	3.6
CONNECTICUT				
1921–24	13.0	5.3	2.9	2.1
1925–29	12.5	6.2	3.5	2.7
1930–34	9.1	4.4	3.6	3.3
1935–39	12.8	8.4	4.3	4.0
1940–44	10.9	0	0	2.2
MINNESOTA				
1910–14	39.3	14.1	7.3	7.1
1915–19	20.2	7.8	4.3	4.4
1920–24	12.9	5.3	3.3	2.9
1925–29	11.4	5.9	3.2	3.0
1930–34	10.5	3.6	2.2	3.0
1935–39	16.9	4.0	2.8	2.1
1940–44	14.4	3.6	1.4	3.8
CALIFORNIA				
1922–24	17.7	10.0	6.0	3.1
1925–29	10.7	4.6	2.8	2.4
1930–34	12.6	4.6	2.4	3.1
1935–39	12.1	4.8	3.4	4.8
1940–44	12.4	7.7	2.2	9.1
BALTIMORE				
1920–24	14.0	4.4	2.8	2.1
1925–29	10.2	4.2	2.6	2.5
1930–34	6.5	4.2	3.7	2.1
1935–39	7.7	1.7	3.8	3.2
1940–44	4.8	4.4	4.0	5.5
NORTH CAROLINA				
1925–29	16.2	4.2	1.9	1.5
1930–34	14.8	4.6	1.7	2.5
1935–39	12.9	4.5	.9	1.7
1940–44	11.5	3.6	1.6	2.8

Mortality rates have declined about equally in all age groups under 20 years in individual States, but in the group over the age of 20, the decline has been less rapid except in Minnesota and Kansas. The reasons for the apparent increase in fatality rates in the age group 20 and over in some States cannot be determined from the data at hand. It is possible that reporting of cases in older persons may have become less complete. Also, as the disease becomes less prevalent, the existence of diphtheria in adults may not be recognized until late in the course of the disease with consequent delays in diagnosis and treatment. These factors might account for increasing fatality rates. A third possible explanation is that with a general reduction in incidence of clinically recognizable and inapparent infections, older persons, because they no longer, or infrequently, have contact with the organism, are more vulnerable when they develop clinical diphtheria. However, there should be similar changes in morbidity if lack of contact with the organism is the only reason for an increasingly higher mortality.

The simultaneous decline in diphtheria morbidity and mortality rates in all age groups of individual States located in different sections of the country, which began after a cyclic increase in incidence between 1915 and 1925, suggests the operation or influence of other factors besides, or in addition to, artificially induced immunity. Studies such as that included in the 1930 White House Conference on Child Health and Protection (*7*) indicated that immunization programs were reaching a relatively large proportion of children in some areas or cities and a very low proportion in others, as late as 1930. In spite of this wide variation, both morbidity and mortality began to decline rapidly after 1925 in all States simultaneously. Lucia (*8*) in 1936 showed similarities in the trend of diphtheria morbidity and mortality in two cities, one in which an active campaign of immunization had been in operation for some time, Providence. R. I., and the other, San Francisco, Calif., where only some immunization had been carried out. Similarly, when the trend of diphtheria mortality in the group under 5 years old in large cities reported by the 1930 White House Conference to have immunized one-third or more of preschool children was compared with the trend in cities reported to have immunized one-fifth or less, there was only one city in the former group in which the trend was significantly different from that in the latter (*9*).

These statements are not intended to be interpreted as arguments against immunization but rather to suggest that Frost's (*10*) concept, first expressed about 20 years ago, that natural forces, such as a diminished infection frequency and a smaller ratio of cases to infections which are described by others as secondary epidemiological factors, also have influenced the decline of diphtheria morbidity. Schuman and Doull (*11*) stated more recently that "it is more likely that causes other than immunization have been a significant factor" in reduction of diphtheria morbidity and mortality. The cyclic increase in diphtheria during the past decade in various parts of the country where immunization apparently has not been neglected such as that reported by Mattison (*12*) in New York State appears to constitute further evidence of the influence of natural forces on the incidence of the disease.

Since morbidity has declined at a satisfactory rate in all age groups, while States have immunized only, or principally, those under 10 years of age, there does not appear to be any good reason for extending immunization on a mass scale to adults just because cases merely are proportionately more frequent in older persons. However, if further studies indicate that the increasing fatality rate in older ages is real and due to loss of protective antibodies, artificial immunization might be indicated beyond the age of 20.

Summary

The age distribution of diphtheria cases has shown some shift toward older age groups in some States. The proportion of deaths in older age groups has increased more than cases. Morbidity rates have declined equally in all age groups in individual States, but death rates among persons over the age of 20 years have declined more slowly than in persons under 20. Case fatality has increased in older age groups in many States. Other factors in addition to immunization appear to have caused the downward trend of diphtheria incidence.

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Tularemia in Man From a Domestic Rural Water Supply

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An explosive water-borne epidemic of tularemia in the Union of Soviet Socialist Republics in 1935 was reported by Karpoff and Antonoff (*1*). Over 43 cases were observed in a group of farm laborers who used water from one stream which was found to be contaminated with *Pasteurella tularensis*. The portal of entry of infection appeared to be the tonsils and buccal mucosa and in some cases the conjunctiva. The anginal form of the infection predominated, but typhoidal and oculoglandular forms were present. Cultures were isolated from some experimental animals injected with tissues from a patient and from others injected with water from the suspected stream. Twenty-one patients were tested after the thirty-fifth day of illness for agglutinins against *P. tularensis*, and all were positive.

Contamination of natural waters in Montana with *P. tularensis* was reported by Parker, Jellison, Kohls, and Davis (*2*); Jellison, Kohls, Butler, and Weaver (*3*); and by Parker, Steinhaus, and Kohls (*4*). Since 1942 contamination of numerous streams at one time or another, often persisting for months, has been repeatedly demonstrated at the Rocky Mountain Laboratory. In most instances, the presence of the organism in water has been associated with the occurrence of tularemia in beavers and muskrats inhabiting the streams or ponds concerned. Many cases of tularemia have been contracted by persons who skinned or handled such diseased animals, but to the present there has been little evidence of human infection resulting from direct contact with contaminated water.

The occurrence in Gallatin County, Mont., of four cases of tularemia associated with one domestic water supply under circumstances which appear to preclude other likely sources of infection is the subject of the present report.

In the summer of 1949, two cases of tularemia, in which the portal of entry appeared to be the throat, were treated by one of the authors (Epler). Neither patient exhibited an external initial lesion of any kind, and neither gave a history of close contact with wild rodents,

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wild rabbits, or other animals that would be likely sources of infection. Both were rural residents who, while working in their gardens, had some exposure to soil and weeds contaminated by mice. Both had used potatoes from a mouse-infested storage cellar. The patients were related and visited each other frequently. As they also experienced similar clinical courses except for the time of onset, a common source of infection in food or water supply was suspected.

It was demonstrated that the water supply at the residence of one of the patients, N. ranch, was contaminated. This water supply had remained practically unchanged for 20 years. When a survey was made of users of this water, it was found that two previous residents, both patients of Epler, had experienced severe and persistent sore throats and protracted illness of undiagnosed etiology. Both exhibited a positive agglutination titer for *P. tularensis* in November 1949. Three others gave significantly positive agglutination titers but recalled no episode of illness suggestive of tularemia. One other former resident showed a low titer of doubtful significance. Two domestic animals on the farm also had significant titers for *P. tularensis*.

Human Cases

The following four human cases are listed in the order in which diagnosis was established and not in the chronological order of their occurrence. Each had a clinical illness consistent with tularemia when infection results from ingestion of the organism.

CASE 1. L. C. moved to the N. ranch with her husband in November 1948, and was taken ill in June 1949 with a severe sore throat When seen by her physician there were ulcers present on the tonsils, and the cervical lymph nodes were enlarged. There was no evidence of an external lesion as the possible site of infection. One of the cervical lymph nodes was incised and drained. The incision was very slow in healing and was still conspicuous when seen October 8. Fourteen grams of chloromycetin were used in treatment of the patient for 7–10 days, beginning August 15, and then a course of dihydrostreptomycin therapy was given. The patient's recovery was uneventful but slow and when visited in October she complained of tiring easily and of muscular weakness.

Agglutination tests on serum samples from this patient gave the following reactions:

July 16, 1949	Complete agglutination at 1:640.
July 28, 1949	Complete agglutination at 1:320.
Aug. 31, 1949	Complete agglutination at 1:1280.

CASE 2. I. W. is a sister-in-law of L. C. (case 1) and lives some 10 miles distant. She was a frequent visitor at the L. C. home on the N. ranch. In August 1949, she developed a sore throat with involvement of the right cervical lymph nodes. She was treated with streptomycin and recovered promptly.

Agglutination tests on serum samples gave the following reactions:

Aug. 16, 1949	Complete agglutination at 1:80.
Sept. 7, 1949	Complete agglutination at 1:640.

I. W. had not experienced direct contact with wild rodents, wild rabbits, or game animals. She had worked in a garden where mice were present. She had no history of tick or insect bite. She had visited the L. C. residence about the time L. C. was ill and at other times had used potatoes from a storage cellar at the L. C. residence.

Case 3. The E. M. family lived at the N. ranch for about 1 year just before its occupancy by the L. C. family. While living at the ranch, E. M. experienced a severe illness and was treated by Epler. Onset was November 15, 1948, with a severe sore throat and with symptoms of a cold. She was confined to bed for 2 weeks. When seen again, November 29, her throat was better, but she was still ill. She was quite ill again in December and phoned her physician, but since the roads were badly blocked with snow the patient was not seen at that time E. M. was well when visited 1 year later, December 1949. A blood sample taken at this time was positive for tularemia, giving complete agglutination at 1:40.

Case 4. D. N. was a member of the family who owned the ranch and had lived there for many years, but moved to Bozeman early in 1948. In November 1945 she experienced a sore throat. This infection was persistent and severe, as she recalls. She received a course of treatment with sulfanilamide but did not feel well the remainder of the winter, although there were no prominent symptoms. D. N. was well when visited December 12, 1949. A blood sample taken at this time was positive for tularemia, giving complete agglutination at a dilution of 1:80

The four following individuals, all previous residents at the same ranch, were found to have some titers against *P. tularensis.* Although no history of illness indicative of tularemia was elicited at the time they were interviewed, the agglutination titers suggest an infection some years previously with consequent loss of titer.

Case 5. K. N., aged 20, is a student at Montana State College, Bozeman. She had lived on the N. ranch until early 1948 and had visited there several times since then. She had no recollection of serious illness while at the ranch or later. While living at the ranch, she had helped her brothers skin muskrats and mink on several occasions. A blood sample taken December 14, 1949, was weakly positive, giving complete agglutination at a dilution of 1:20 for *P. tularensis.*

Case 6. J. N., aged 18, who is also a student at Montana State College, had essentially the same history as her sister K. N. (case 5). She could not recall having experienced any serious illness but had lived at the ranch until 1948. A blood sample taken December 14, 1949, was positive for tularemia, giving complete agglutination at a dilution of 1:160.

Case 7. M. N., aged 36, was raised on the N. ranch and worked there frequently until 1948. When interviewed in December 1949, he could not recall having had any serious illness. A blood sample taken at this time was weakly positive for tularemia, giving complete agglutination at a titer of only 1:20.

Case 8. W. N., aged 42, is now a resident of DeSmet, Idaho. He was requested to submit a blood specimen. This specimen tested at this laboratory showed an agglutination of 3+ at 1:20 and 2+ at 1:40, a weak reaction of doubtful significance, which may indicate an infection some years previously. No history of unusual illness was obtained from W. N.

Most of the serum samples from these individuals were also tested for agglutination against *Brucella abortus.* In no instance did it appear that the observed titer was due to *B. abortus* infection rather than *P. tularensis.*

These individuals with respective titers for *P. tularensis* and *B. abortus* are summarized as follows:

Patient	Residence at N. ranch	Illness	Agglutination titer, 1949	
			P. tularensis	*B. abortus*
D. N.	Until 1948	Severe sore throat November 1945.	4+, 1:80	2+, 1:20
J. N.	do	No history of illness	4+, 1:160	0, 1:20
K. N.	do	do	4+, 1:20	Negative
M. N.	do	do	4+, 1:20	Negative
W. N.	Visited ranch 2 weeks, 1945.	do	3+, 1:20	Negative
E. M.	1948	Severe sore throat November 1948.	4+, 1:40	Negative
L. C.	Fall 1948 to December 1949.	Severe sore throat June 1949.	4+, 1:1280	4+, 1:80
I. W.	Frequent visitor 1949	Severe sore throat August 1949.	4+, 1:640	Negative

Infection in Animals

There were two dogs on the N. ranch on October 8. An old dog, very ill, probably from mechanical injuries, was destroyed a few days later. A blood sample taken from it was tested for agglutinins and found negative. The other dog, a young animal, was not known to have been ill. He was bled October 27 and again December 14; both samples gave complete agglutination of *P. tularensis* at a dilution of 1:80.

A sow and her litter of 10 pigs, about 3 months old, that had been raised on the ranch were bled December 14. No illness had been observed in these animals. One of the young pigs gave a definitely positive agglutination reaction and four others showed low-titer agglutinations for *P. tularensis* as follows:

Pig No.	*Agglutination titer* 1:20	1:40	1:80	1:160	1:320
1	3+	2+	0	0	0
2	3+	3+	2+	0	0
6	2+	0	0	0	0
7	4+	4+	4+	3+	2+
9	2+	0	0	0	0

Blood samples from the other young pigs and sow were entirely negative at dilutions of 1:20 and higher. In January 1950, pig No. 7, which showed the highest agglutination titer, was autopsied and numerous tissue samples were saved in a frozen condition for later testing. These tissues have not yet been tested.

The main herd of cattle usually kept on the ranch had been removed to winter range near Logan, but four animals, two cows and two calves, were bled on December 14. Agglutination tests on these samples were entirely negative.

The dogs, pigs, and cattle had access to water from the marshy area which was the source of the domestic water supply. The possibility exists that the dogs and pigs had eaten infected rodents.

In December an attempt was made to trap mice in the vicinity of the water source, but none were taken. A few house mice, *Mus musculus*, and one deer mouse, *Peromyscus*, were trapped in the farm buildings but exhibited no evidence of tularemia infection.

Infection in the Domestic Water Supply

The domestic water supply of the N. ranch comes from a marshy, spring area along a small stream about 350 yards south of the residence. This area, 48 feet wide and 126 feet long, was fenced to keep out livestock and as a result was grown over with water cress, weeds, and grass. The water surface of the pond was entirely covered by vegetation. There was evidence of field-mouse and pocket-gopher activity around the water source, and there was abundant opportunity for contamination of the water by these rodents. The lower edge of the marsh was blocked by a low dam into which was fitted the intake end of a water pipe. The water flowed through pipe by gravity into an open concrete chamber in the basement of the house from which it was pumped into a pressure tank for distribution to the upper floors. The basement receiving chamber, while open at the top, was clean and not a likely source of contamination. This water system was installed in 1930, replacing a well on the premises.

On October 8, when the first visit was made to the N. ranch, a single water sample was taken from the kitchen faucet. This was kept refrigerated until tested on October 10. Two guinea pigs, Nos. 25300 and 25301, were each injected intraperitoneally with 10 cc. of water. On October 23, 13 days later, guinea pig No. 25300 was observed to be moribund late in the evening. A heart-blood sample was taken for culture and the animal was autopsied. Lesions typical of tularemia were observed. Heart-blood cultures on glucose cystine agar yielded a pure culture of *P. tularensis* which was further confirmed by agglutination with known positive serum. Transfers of tissue from No. 25300 to guinea pigs and mice produced typical infections with characteristic gross lesions, and additional cultures were isolated. The other test animal, No. 25301, survived and was normal when sacrificed and autopsied 48 days later. These experimental animals were kept in large buckets in laboratory rooms and were well isolated from any known tularemia-infected animals. The possibility of laboratory infection in animal No. 25300 is extremely remote.

On October 27, the domestic water supply at the N. ranch was again sampled. Four samples were taken as follows: No. 1, kitchen tap; No. 2, basement pump box; No. 3, intake at spring; No. 4, mud from intake reservoir at the spring. Sample No. 1, from the kitchen tap, again produced tularemia in one of two test guinea pigs, as confirmed by autopsy, culture, and agglutination of culture with known positive serum. The samples from the basement pump box, the intake at the spring, and mud from the intake reservoir gave negative results.

Infection in Other Streams and Water Supplies

While certain tularemia cases were being investigated in Gallatin County, Mont., in March 1949. water samples were taken from 12 streams and tested for the presence of *P. tularensis* by injecting them into guinea pigs.

Ten cc. from each sample were injected into each of two guinea pigs. Infection was demonstrated in four of these samples as follows: (1) from Dry Creek, about 10 miles north of Belgrade; (2) from Spring Creek, about 4 miles north of Belgrade; (3) from a roadside stream near Gallatin Gateway; and (4) from a roadside stream near Bozeman Hot Springs.

Two of four stream samples taken October 5 to 8 were positive for tularemia by animal injection. The positive samples were from Smith Creek 5 miles north of Belgrade, and Spring Creek from the same station that was found positive with the March sample.

Six streams were sampled on October 27, three of which proved positive. These were (1) a roadside stream near Bozeman Hot Springs which was positive in March 1950; (2) a small stream on the campus of Montana State College; and (3) an irrigation ditch on the M. farm in Bridger Canyon.

On December 14 to 16, additional water samples were taken from 12 streams in Gallatin County, and when tested by animal injection, two were positive for *P. tularensis*. These were (1) a stream near the E. O. residence in Bridger Canyon, and (2) the stream on the Montana State College campus which was found positive when sampled on October 27.

During the course of these studies and with the cooperation of the county health officer, Dr. Jerome Andes, water samples were collected from 75 domestic rural water supplies in Gallatin County. These included deep and shallow wells, springs, and small streams. Some of these came from households where recent tularemia cases had occurred without obvious source of infection. All these samples were tested by injection into guinea pigs. Usually four guinea pigs, each injected with 10 cc., were used on each sample. No evidence of infection was demonstrated in any of the samples.

Incidence of Tularemia in Gallatin County

Twelve cases of tularemia were reported in Gallatin County, Mont., for 1949 by the Montana State Health Department—more than for any other county in the State. Some of these, however, had occurred in previous years and were confirmed by serological test during 1949.

Some of the cases were found as a result of our studies on tularemia in that area. As a measure of the incidence of the disease in the general population, agglutination tests were made on all serum samples received from Gallatin County for Wassermann tests at the State Hygienic Laboratory during January and February 1950. Of the 224 serum samples received, 214 were completely negative for *P. tularensis* agglutination at 1:20 and higher dilutions; 9, or 4.0 percent, gave agglutination (2+, 3+, or 4+) at dilutions of 1:20 to 1:40; only one with a titer of 4+ at 1:40 could be considered positive without supporting clinical evidence. The results on these sera were:

Serum No.	*Agglutination titer* *1:10*	*1:20*	*1:40*	*1:80*
1	4+	4+	4+	0
2	4+	4+	0	0
3	4+	4+	0	0
4	4+	2+	0	0
5	4+	2+	0	0
6	4+	1+	0	0
7	4+	0	0	0
8	3+	2+	0	0
9	3+	2+	0	0
10	2+	0	0	0

In the survey of residents and contacts at the N. ranch, 23 individuals were tested for tularemia, including the observed clinical cases. Of these, 7, or 30 percent, had agglutination titers of 4+ at 1:20 or higher. Sixteen had no demonstrable titers for *P. tularensis*. This is in contrast to the 4 percent observed in the general population. The people tested in this survey who showed any degree of agglutination at 1:20 or higher dilutions are listed below:

Patient	*Agglutination titer* *1:20*	*1:40*	*1:80*	*1:160*	*1:320*	*1:640*	*1:1280*
L. C.	4+	4+	4+	4+	4+	4+	4+
I. W.	4+	4+	4+	4+	4+	4+	0
J. N.	4+	4+	4+	4+	2+	0	0
D. N.	4+	4+	4+	2+	0	0	0
E. M.	4+	4+	3+	2+	1+	0	0
K. M.	4+	3+	1+	0	0	0	0
M. N.	4+	2+	0	0	0	0	0
W. N.	3+	2+	0	0	0	0	0

Summary

The diagnosis of tularemia, with primary infections in the tonsils and buccal mucosa, in a rural housewife and her sister-in-law suggested a common source of infection in contaminated food or water. The domestic water supply at one residence was shown to be contaminated with *P. tularensis* in two consecutive tests. A survey of the previous residents revealed that two of the housewives had experienced similar clinical illnesses and now gave positive agglutination reactions. Three others gave significantly positive agglutination tests but recalled no previous suggestive illness. Still another resident gave a low titer agglutination test of doubtful significance. Other individuals so far tested who were using, or had used, this same water showed no evidence of tularemia infection by serological test.

The instance reported here, involving 4 clinical and 4 probable cases, differs from the spontaneous epidemic cited (*1*) in the Union of Soviet Socialist Republics of 43 or more cases. Here only a few people were using the water supply at any one time. Contamination obviously persisted for a period of years, as the first observed clinical case occurred in November 1945 and the last in August 1949.

ACKNOWLEDGMENTS

The writers are indebted for assistance in this investigation to: Dr. L. J. Lull, former epidemiologist of the Montana State Board of Health, who referred information on the first diagnosed cases to the Rocky Mountain Laboratory; Dr. Jerome Andes, health officer for the city of Bozeman and Gallatin County, who collected many samples from domestic water supplies in Gallatin County, and assisted in other ways; Dr. Lee Seghetti, veterinary pathologist, Agricultural Experiment Station, Bozeman, Mont., who secured blood samples from domestic animals; Lillian Glesne, biological aid, who performed agglutination tests at the Rocky Mountain Laboratory; and Byron Thrailkill, technologist, who tested the numerous water samples.

Dr. R. R. Parker, late Director of the Rocky Mountain Laboratory, was intensely interested in tularemia and especially in its occurrence in water and semiaquatic animals. The present study is a continuation of a broad research program which he initiated.

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Incidence of Disease

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

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UNITED STATES

Reports From States For Week Ending September 2, 1950

For the current week, new cases of acute poliomyelitis reported in the Nation numbered 1,627, a 0.6 percent increase over the 1,617 cases reported last week. This is the fifteenth consecutive week of increase over the preceding week. However, the rate of increase continues to slacken as this is the lowest percentage increase over the preceding week during the 15-week period. For the corresponding week last year, 3,193 cases were reported.

The cumulative total (12,356) for the current "disease" year was below the corresponding total (22,809) for last year, the highest on record. The "disease" year for acute poliomyelitis begins with the twelfth week of the calendar year. The cumulative total for the calendar year was 13,490, compared with the total of 23,724 for the corresponding period last year.

Comparative Data for Cases of Specified Reportable Diseases: United States

[Numbers after diseases are International List numbers, 1948 revision]

Disease	Total for week ended		5-year median 1945–49	Seasonal low week	Cumulative total since seasonal low week		5-year median 1944–45 through 1948–49	Cumulative total for calendar year		5-year median 1945–49
	Sept. 2, 1950	Sept. 3, 1949			1949–50	1948–49		1950	1949	
Anthrax (062)	-----	-----	(1)	(1)	(1)	(1)	(1)	29	38	(1)
Diphtheria (055)	82	120	153	27th	545	818	1,092	3,673	4,586	7,389
Acute infectious encephalitis (082)	60	28	28	(1)	(1)	(1)	(1)	594	445	363
Influenza (480–483)	626	548	617	30th	3,650	2,787	2,844	249,909	78,654	142,483
Measles (085)	701	571	680	35th	307,301	640,911	586,282	258,171	558,518	551,414
Meningococcal meningitis (057.0)	36	40	43	37th	3,630	3,265	3,534	2,717	2,421	2,562
Pneumonia (490–493)	769	704	-------	(1)	(1)	(1)	------	62,131	57,298	----
Acute poliomyelitis (080)	1,627	3,193	1,505	11th	[2] 12,356	22,809	11,967	[2] 13,490	23,724	12,434
Rocky Mountain spotted fever (104)	14	15	16	(1)	(1)	(1)	(1)	383	483	461
Scarlet fever (050)	264	214	402	32d	766	658	1,149	40,936	58,324	63,252
Smallpox (084)	-----	-----	------	35th	46	51	201	26	41	147
Tularemia (059)	16	19	14	(1)	(1)	(1)	(1)	679	842	701
Typhoid and paratyphoid fever (040, 041)[3]	96	99	108	11th	1,821	2,157	2,157	2,331	2,645	2,645
Whooping cough (056)	1,683	1,309	1,970	39th	111,542	50,933	94,320	90,006	40,900	68,302

[1] Not computed. [2] Delayed reports: Iowa, 17 August cases, not allocated to specific weeks; Arkansas, week ended June 3, 1 case. Deduction: Michigan, week ended July 1, 1 case. [3] Including cases reported as salmonellosis.

For the current week, reported cases of acute poliomyelitis decreased from the preceding week in four of the total of nine geographic divisions. These decreases ranged from 62 (271 to 209) cases reported in the South Atlantic States to 7 (129 to 122) cases in the Pacific States. The remaining two divisions reporting decreases were the East South Central and the West South Central. The four divisions increasing over the preceding week ranged from 55 cases (314 to 369) in the Middle Atlantic States to 15 (59 to 74) in the New England States. The remaining two divisions reporting increases were the East North Central and the West North Central. The Mountain States reported 34 cases which was no change from the number reported for the preceding week.

For the current week, the States reporting the largest numbers of cases were: New York (286), Illinois (122), Michigan (116), Texas (102), Ohio (98), Iowa (95), and California (65).

The total number of cases of infectious encephalitis reported for the week was 60 compared with 28 reported for the corresponding period last year. For the calendar year a total of 594 cases was reported, the highest total in the past 5 years.

No smallpox was reported in the United States. The current week ends the "disease" year for smallpox with a total of 46 cases compared with a corresponding total of 51 cases for the previous year. This is the lowest total number reported for the past 9 years.

The "disease" year for reported cases of measles also ends with the current week. A total of 701 cases was reported for this week. The cumulative total for the "disease" year was 307,301. The 5-year (1945–49) median was 586,282.

Deaths During Week Ended September 2, 1950

	Week ended September 2, 1950	*Corresponding week, 1949*
Data for 94 large cities of the United States:		
Total deaths	8,278	8,245
Median for 3 prior years	8,470	----------
Total deaths, first 35 weeks of year	323,715	324,344
Deaths under 1 year of age	631	603
Median for 3 prior years	672	----------
Deaths under 1 year of age, first 35 weeks of year	21,736	22,956
Data from industrial insurance companies:		
Policies in force	69,627,042	70,196,573
Number of death claims	10,815	11,630
Death claims per 1,000 policies in force, annual rate	8.1	8.6
Death claims per 1,000 policies, first 35 weeks of year, annual rate	9.4	9.3

Reported Cases of Selected Communicable Diseases: United States, Week Ended September 2, 1950

[Numbers under diseases are International List numbers, 1948 revision]

Area	Diphtheria (055)	Encephalitis, infectious (082)	Influenza (480–483)	Measles (085)	Meningitis, meningococcal (057.0)	Pneumonia (490–493)	Poliomyelitis (080)
United States	82	60	626	701	36	769	1,627
New England	2	---	1	52	2	19	74
Maine	---	---	---	2	---	---	3
New Hampshire	---	---	---	---	---	---	---
Vermont	---	---	---	---	---	---	1
Massachusetts	2	---	---	37	---	---	33
Rhode Island	---	---	1	3	1	2	5
Connecticut	---	---	---	10	1	17	32
Middle Atlantic	6	9	1	182	7	122	369
New York	6	8	(1)	80	4	84	286
New Jersey	---	---	1	56	---	14	34
Pennsylvania	---	1	---	46	3	24	49
East North Central	4	3	25	126	9	46	409
Ohio	---	---	---	---	3	---	98
Indiana	1	---	---	9	---	---	18
Illinois	---	2	---	36	4	32	122
Michigan	3	1	---	26	2	8	116
Wisconsin	---	---	25	55	---	6	55
West North Central	4	5	2	25	2	36	186
Minnesota	1	4	---	4	---	4	27
Iowa	3	---	---	1	---	1	95
Missouri	---	---	2	10	1	8	16
North Dakota	---	1	---	4	---	21	1
South Dakota	---	---	---	1	---	---	7
Nebraska	---	---	---	---	---	---	16
Kansas	---	---	---	5	1	2	24
South Atlantic	32	2	153	64	5	231	209
Delaware	---	---	---	2	---	---	3
Maryland	2	2	---	2	---	14	37
District of Columbia	---	---	---	2	---	13	15
Virginia	5	---	128	28	---	7	45
West Virginia	3	---	---	1	1	2	9
North Carolina	14	---	---	22	1	---	49
South Carolina	6	---	8	---	---	7	17
Georgia	2	---	17	5	3	184	14
Florida	---	---	---	2	---	4	17
East South Central	15	---	2	24	2	61	72
Kentucky	3	---	---	---	1	5	28
Tennessee	1	---	---	14	1	17	23
Alabama	6	---	2	3	---	21	8
Mississippi	5	---	---	7	---	18	13
West South Central	15	2	401	99	6	209	152
Arkansas	2	---	58	2	2	4	15
Louisiana	1	---	---	---	2	9	16
Oklahoma	1	---	11	6	---	10	19
Texas	11	2	332	91	2	186	102
Mountain	2	---	30	61	1	19	34
Montana	---	---	13	2	---	---	3
Idaho	---	---	3	1	---	---	8
Wyoming	---	---	---	---	---	---	---
Colorado	1	---	4	29	---	9	7
New Mexico	---	---	---	7	---	2	5
Arizona	---	---	10	---	---	6	11
Utah	1	---	---	22	1	2	---
Nevada	---	---	---	---	---	---	---
Pacific	2	39	11	68	2	26	122
Washington	---	---	---	8	---	---	41
Oregon	---	---	8	12	---	8	16
California	2	39	3	48	2	18	65
Alaska	---	---	---	---	---	1	---
Hawaii	---	---	38	2	---	---	---

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[1] New York City only.

Reported Cases of Selected Communicable Diseases: United States, Week Ended September 2, 1950—Continued

[Numbers under diseases are International List numbers, 1948 revision]

Area	Rocky Mountain spotted fever (104)	Scarle fever (050)	Small-pox (084)	Tulare-mia (059)	Typhoid and para-typhoid fever [1] (040, 041)	Whoop-ing cough (056)	Rabies in animals
United States	**14**	**264**		**16**	**96**	**1,683**	**122**
New England		**14**		**1**	**5**	**191**	
Maine		1				20	
New Hampshire							
Vermont		1				11	
Massachusetts		9		1	4	89	
Rhode Island					1	31	
Connecticut		3				40	
Middle Atlantic		**33**			**8**	**287**	**29**
New York		[2] 27			4	136	24
New Jersey		4				67	
Pennsylvania		2			4	84	5
East North Central	**3**	**55**		**1**	**13**	**438**	**30**
Ohio		22			6	70	5
Indiana	1	1			1	20	22
Illinois	2	13		1	4	42	
Michigan		14			1	204	3
Wisconsin		5			1	102	
West North Central	**2**	**13**		**3**	**1**	**95**	**4**
Minnesota		2				21	
Iowa		3				20	4
Missouri	1	2		2	1	38	
North Dakota		1				9	
South Dakota							
Nebraska		2					
Kansas	1	3		1		7	
South Atlantic	**7**	**47**		**1**	**16**	**182**	**15**
Delaware						7	
Maryland		4				18	
District of Columbia		2				9	
Virginia	2	5			4	42	
West Virginia		1			1	5	1
North Carolina	5	29			1	76	
South Carolina		1			2	8	8
Georgia		4			8	15	6
Florida		1		1		2	
East South Central	**1**	**40**			**10**	**32**	**23**
Kentucky		8			4	2	15
Tennessee		26			5	16	5
Alabama	1	4				12	2
Mississippi		2			1	2	1
West South Central	**1**	**20**		**6**	**24**	**261**	**18**
Arkansas	1	3		5	9	18	1
Louisiana					3		
Oklahoma		3		1	2	6	4
Texas		14			10	237	13
Mountain		**5**		**4**	**5**	**110**	**3**
Montana				1	1	10	
Idaho					1	15	
Wyoming							
Colorado		3			2	17	3
New Mexico					1	49	
Arizona						17	
Utah		2		3		2	
Nevada							
Pacific		**37**			**14**	**87**	
Washington		10				32	
Oregon		5				20	
California		22			14	35	
Alaska				1			
Hawaii						2	

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[1] Including cases reported as salmonellosis.
[2] Including cases reported as streptococcal sore throat.

FOREIGN REPORTS

CANADA

Reported Cases of Certain Diseases—Week Ended August 12, 1950

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Brucellosis					3	1	2			1	7
Chickenpox			13		25	71	12	24	19	39	203
Diphtheria					5	1					6
Dysentery, bacillary					4		2			61	67
Encephalitis, infectious						1					1
German measles			3		2	39		8	13	7	72
Measles	2		4		71	158	16	10	3	36	300
Meningitis, meningococcal								2			2
Mumps			2		28	68	15	41	49	24	227
Poliomyelitis	1				3	19	1	1	7		32
Scarlet fever	1		1	2	7	8	2		10	3	34
Tuberculosis (all forms)	6		3	11	55	21	21	13		18	148
Typhoid and paratyphoid fever			1		4	1		2	1		9
Venereal diseases:											
Gonorrhea	2		11	7	96	43	50	24	45	65	343
Syphilis	2		5	5	66	19	1	10	1	9	118
Whooping cough	1		11		49	51	3		1	19	135

FINLAND

Reported Cases of Certain Diseases—June 1950

Disease	Cases	Disease	Cases
Diphtheria	39	Scarlet fever	713
Malaria	1	Typhoid fever	7
Meningitis, meningococcal	3	Venereal diseases:	
Paratyphoid fever	42	Gonorrhea	536
Poliomyelitis	17	Syphilis	28

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

Burma. During the week ended August 12, 1950, 28 cases of cholera, with 27 deaths, were reported.

India (French). Cholera has been reported in French India as follows: In Pondicherry, January 1–April 1, 1950, 30 cases, 24 deaths;

April 2–July 1, 177 cases, 83 deaths; July 2–29, 231 cases, 118 deaths; in Karikal, January 1–April 1, 381 cases, 199 deaths.

Plague

China. Reports of plague in China have been received as follows: January 1–31, 1950, Chekiang Province 4 cases, Fukien Province 51 cases, 23 deaths; February 1–28, Chekiang Province 10 cases (including 4 cases of pneumonic plague), 4 deaths, Fukien Province 56 cases, 52 deaths; March 1–31, Fukien Province 103 cases, 43 deaths; April 1–30, Chekiang Province 2 cases, 1 death, Fukien Province 263 cases, 95 deaths; May 1–31, Chekiang Province 7 cases, 3 deaths, Fukien Province 200 cases, 70 deaths; June 1–30, Chekiang Province 3 cases, Fukien Province 23 cases, 11 deaths.

Peru. Plague has been reported in Peru as follows: June 1–30, 1950, at Caral Farm, Chancay Province, Lima Department, 2 cases; July 1–31, in Trujillo City suburbs, Trujillo Province, Libertad Department, 1 case, and at Luya Farm, Chiclayo Province, Lambayeque Department, 1 case.

Smallpox

Arabia. On August 8, 1950, two cases of smallpox were reported in the port of Ummsaid, Qatar.

British East Africa. On July 23, 1950, three cases of smallpox were reported in the port of Minkindani, Tanganyika.

China. In Swatow, during the period January 1–March 31, 1950, 236 cases of smallpox, with 96 deaths, were reported, and 19 cases, 9 deaths were reported during the month of April. Numbers of cases reported in Shanghai since the beginning of the current year are as follows: January 1–April 29, 138 (1 death); May 20–June 24, 67; July 1–29, 47.

Yellow Fever

Gold Coast. During the period August 10–11, 1950, 1 death from suspected yellow fever was reported in the port of Accra.

Sierra Leone. The suspected fatal case of yellow fever reported at Pendembu, Kailahun District, August 1–8, 1950 (see PUBLIC HEALTH REPORTS for September 15, 1950, p. 1200) was not confirmed.

Training Course in Rat-Borne Disease

The 11th semi-annual field training course in rat-borne disease prevention and control will be held by the Communicable Disease Center, Public Health Service, in Atlanta October 2–20.

Rat-control personnel of the armed forces are especially invited, officials of the Center announced. The dangers of rat-borne disease to military personnel in our expanding military commitments make this type of training more important than ever before.

The course is designed for rat control specialists including personnel of large city and county health departments, State health departments, and the Public Health Service.

"Rat-Borne Disease Prevention and Control," a new Communicable Disease Center manual, is the basic handbook for the course.

Following the 3-week training period in rat-borne disease, the Center will give a 1-week concentrated field training course in the control of flies, mosquitoes, and other insect vectors of disease. Personnel interested in both rat and insect control may attend both courses.

Environmental sanitation is stressed as one of the most important methods of both rat and insect control.

Applications for the courses may be sent to the Medical Officer in Charge, Communicable Disease Center, 605 Volunteer Building, Atlanta, Ga. Attention: Chief, Training Services.

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The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

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Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

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Public Health Reports

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Specific Causes of Illness Found in Monthly Canvasses of Families

Sample of the Eastern Health District of Baltimore, 1938–43

By SELWYN D. COLLINS, Ph.D., F. RUTH PHILLIPS, and DOROTHY S. OLIVER*

Studies have been published on the 5-year Baltimore Morbidity Survey covering particular kinds of data or data for a single year of the study. However, this is the first report which attempts to deal with the general aspects of morbidity in what may be termed the entire sample area of the study. It includes data for all of the 17 city blocks canvassed for 5 years, and for the 18 blocks canvassed for 3 years or less.[1]

Selection and Characteristics of the Sample Population

Selection of Sample

The method of selecting the sample to be studied has been described elsewhere (*5*) but may be briefly summarized here. The canvassed families all lived in the original Eastern Health District of Baltimore, wards 6 and 7 (*4, 8, 9, 10*), adjacent to the Johns Hopkins School of Hygiene and Public Health and the Johns Hopkins Hospital. In these two wards there are 10 census tracts. From other censuses of the entire two wards that constituted the original district, data were available on the number of houses in each square block (*14*). With the aid of these data entire city blocks were selected to run in approximately parallel diagonal directions throughout the two wards. An effort was made to select a sufficient number of blocks from a census tract so that the sample drawn from that tract would constitute the same percentage of the total sample population as the white population of the census tract was of the white population of the entire Eastern Health District (*5*).

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*From the Division of Public Health Methods, Public Health Service. The Milbank Memorial Fund, the Departments of Biostatistics and Epidemiology of the Johns Hopkins School of Hygiene and Public Health, and the Baltimore City Health Department cooperated in the study. Grateful acknowledgment is made to Miss Jean Downes of the Milbank research staff who participated in all phases of the Baltimore Morbidity Survey.

[1] Death and case rates for nonwhites are usually considerably higher than for whites. Because this was a relatively small study it seemed advisable to confine it to the one broad racial group of white persons.

In the last 2 years of the study, families living in an additional area and having one or more chronic diseases among their members were canvassed periodically for a special study of chronic diseases. None of these families selected because of the presence of chronic disease is included in the Eastern Health District sample study of general morbidity of all types.

The illness data in this paper are limited to diseases as they affect persons of all ages and both sexes. Subsequent reports will contain data on age and sex differences in illness rates; circumstances of accidents and the nature of the resulting injuries; and various other aspects of morbidity data.

In the 35 blocks selected for canvassing, every household was covered. It was not practicable to follow the original family when it moved out of the study blocks; therefore, the family which moved away was dropped and the new family which moved into the house was added to the study. As indicated above, 17 of the 35 blocks [2] were retained throughout the 5-year study; 17 of the other blocks were dropped at the end of the third year and one was dropped within the first 2 months of that year.

In the entire sample of 34 blocks canvassed for all of the first 3 study years there were 5,297 persons under observation in June of 1938—the first month of the study; 3,286 of these same individuals were still under observation for 10 or more months (mostly 12 months) of the third study year. Thus at the end of 3 years, 62 percent of those first enrolled were still in the study. The other 38 percent had dropped out in the 3 years (annual percentage decrease [3] of 14.7) because of moves out of the sample blocks and, in a few instances, because of death or refusal to cooperate further. The blocks canvassed all 5 years showed for the first 3 years the same annual loss of persons to the survey, 14.8 percent, as for the whole 5 years. The percentage loss per year for the blocks canvassed for only 3 years was 14.6.

The above data exclude for all 3 years the block dropped in the first 2 months of the third study year; although they neglect the few persons who left the sample area and later moved back into it, the number of such persons was small.

In the 17 blocks canvassed for all 5 years, similar computations were made to determine losses during the whole 5-year period. In these blocks 2,990 persons were under observation in June of 1938—the first month of the study; 1,343 of these same individuals were still under observation for 10 or more months of the fifth study year. Thus at the end of 5 years, 45 percent of those first enrolled in these 17 blocks were still under observation. The 55 percent of original entrants into the study who dropped out during the 5-year period represent an average decrease of 14.8 percent per year.

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[2] One block contained several semitransient hotel-apartment houses where there was so much moving that it was impracticable to keep contact with the families even for short periods. This whole block was dropped early in the third study year but the data are included in this report for the time it was canvassed. There was a loss during the 2 years of 30 percent of the 238 persons originally enrolled in this block, which is equivalent to a loss of 16.2 percent per year.

[3] Computed as the mean percentage decrease which applied to the remaining population at the beginning of each study year would yield a 38 percent decrease in the 3-year period. Other similar computations based on 2- and 3-year periods were done in the same way.

For the blocks canvassed all 5 years similar computations were made at 2-year intervals, measuring from the beginning month of each year to the end of the next year. The data for each period follow:

	Percentage loss of population		*Number observed*	
2-year intervals	*Equivalent loss per year*	*For the 2 years*	*1st month of each pair of years*	*10 or more months during second of each pair of years*
1st–2d year	15. 0	27. 7	2, 990	2, 161
2d–3d year	14. 4	26. 7	2, 809	2, 133
3d–4th year	15. 5	28. 5	2, 852	2, 038
4th–5th year	16. 7	30. 7	2, 739	1, 899

The percentages lost to the study indicate what was observed by the field workers—that toward the later years a higher proportion of the families then included in the study moved away or dropped out for other reasons, perhaps because of loss of interest.

None of the above data count as lost to the study any persons in blocks dropped by action of those in charge of the investigation, that is, the one block dropped in the first 2 months of the third year and the 17 blocks dropped at the end of that year.

Characteristics of the Sample Population

Before considering the frequency of illness observed in the sample of the Eastern Health District, it seems worth while to examine certain characteristics of the population that may influence the illness rate. However, the fact that these characteristics are similar to those of other groups does not mean that illness rates in the sample group studied are necessarily representative of rates in other larger groups.

Table 1 shows the age distribution of all persons in the Eastern Health District sample, in comparison with several larger groups. The mean age in the Eastern Health District sample was 31.3 years as of January 1, 1941, the midpoint of the middle year, for persons under observation during that year. While the sample had slightly more children under 15 years of age than in the other groups cited, the distribution on the whole is similar to the distributions of the white population in Baltimore and in cities with populations of 100,000 and over in the Middle Atlantic and South Atlantic States.

The mean age of family heads in the sample blocks in the third or middle study year was 46.2 years. Of all family heads, 5 percent were under 25 years, only one person of this group being under 20 years old. The next four 10-year age groups contained 21, 23, 24, and 15 percent, respectively. Only 12 percent of family heads were 65 years and older, and only 3 percent were 75 and over. Eighty-five percent of the family heads were males and 15 percent females.

Table 2 shows the ratio of males to females of specific ages. In the ages under 5 and 5–14 there is in each of the groups shown in the table

Table 1. *Age distribution of white population of the canvassed blocks of the original Eastern Health District*[1] *of Baltimore, compared with white populations of other areas*

[Percentage of persons in each age group]

Age	Sample E. H. D.[1] population		Original E. H. D.[1] population, 1940	Baltimore population, 1940	Cities over 100,000 in Middle Atlantic States,[2] 1940	Cities over 100,000 in South Atlantic States, 1940	Cities over 100,000 in United States, 1940	Total United States, 1940	C. C. M. C.[3] cities over 100,000 (individuals observed)
	Years of life 1938–43[4]	Persons observed in middle year[5]							
All known ages	100	100	100	100	100	100	100	100	100
Under 5	7.4	8.2	6.2	6.2	6.1	6.0	6.2	7.8	14.4
5–9	7.4	7.4	6.4	6.4	6.5	6.0	6.3	7.9	13.8
10–14	8.1	7.3	7.7	7.7	7.9	7.1	7.4	8.8	10.9
15–19	9.5	9.5	9.5	8.9	8.9	8.4	8.4	9.3	7.2
20–24	8.9	10.5	11.3	9.5	9.3	9.8	9.1	8.7	6.1
25–34	17.5	17.9	18.4	17.4	16.9	18.9	17.8	16.2	16.5
35–44	14.8	14.2	14.1	15.3	14.8	15.9	15.8	13.9	15.9
45–54	12.7	12.1	12.3	12.9	13.5	12.8	13.6	12.0	8.6
55–64	7.7	7.4	7.9	8.6	9.0	8.4	8.8	8.3	4.0
65–74	4.4	4.2	4.6	5.0	5.1	4.8	4.9	5.0	1.8
75 and over	1.4	1.5	1.5	2.0	1.9	1.8	1.9	2.1	.6

[1] Original Eastern Health District included wards 6 and 7 only.
[2] Middle Atlantic exclusive of New York City.
[3] Study of 9,000 families in a group canvassed by the Committee on the Costs of Medical Care (*1*).
[4] Ages as of midpoint of each study year in which observed.
[5] Ages as of midpoint of third study year, January 1, 1941.

an excess of males over females. Above age 15 the ratios are, with few exceptions, less than 100, which means that there are fewer males than females. In general, the sex distribution in the Eastern Health District sample is reasonably similar to data in other large cities.

Table 2. *White males per 100 white females of specific ages in the canvassed blocks of the original Eastern Health District*[1] *of Baltimore, compared with white populations of other areas*

[Females of same age-group=100]

Population group	All ages	Under 5	5–14	15–24	25–44	45–64	65 and over
Eastern Health District sample (years of life, 1938–43)[2]	97.6	103.2	106.5	97.7	97.9	96.9	72.5
Eastern Health District total, 1940	97.7	106.6	104.4	90.4	101.8	99.9	74.8
Baltimore, 1940	97.4	104.0	102.9	97.9	100.9	95.3	73.0
U. S. cities over 100,000, 1940	96.5	104.0	102.2	93.0	95.0	101.5	81.0
U. S. total, 1940	101.2	103.8	103.4	99.6	99.3	104.9	95.0

[1] Original Eastern Health District included wards 6 and 7 only.
[2] Ages as of midpoint of each study year in which observed.

In the matter of marital status (table 3) the Eastern Health District sample is fairly similar to other groups. In the sample, as in other areas, more women than men of the early ages were married. Thus, the one 19-year-old boy who was married constituted 0.3 percent of the males 15–19 years of age; 11 percent of the girls of those ages were married. The excess of married women continued through the 25–29 age group, but at every age above 30 years the percentage of men who were married exceeded that of the women. The same general age-sex patterns are true of Baltimore as a whole, but the percentage of men over 30 years of age who were married runs consistently higher in the Eastern Health District sample.

Table 3. *Marital status of white persons of specific ages in canvassed blocks of the Eastern Health District, as compared with white populations* [1] *of other areas*

Population group	Percentage of persons of specified ages who were married									
	Total 15 years and older	Total 15–44	15–19	20–24	25–29	30–34	35–44	45–54	55–64	65 and over
Both sexes:										
Eastern Health District sample [1] (middle year)	59.5	55.5	5.5	43.4	66.4	77.5	77.8	79.4	68.5	42.3
Baltimore, 1940	58.8	55.9	5.3	37.8	66.1	76.5	79.1	76.0	64.8	40.9
Middle Atlantic cities [2] over 100,000	57.0	51.3	2.4	27.1	59.9	73.6	78.8	77.4	67.6	44.2
C. C. M. C.[3] cities over 100,000	71.0	68.4	2.5	39.4	81.9	89.8	90 6	89.4	74.6	46.3
United States, 1940	61.3	56.6	6.1	38.3	68.2	79.0	82.3	80.1	71.4	49.0
Males:										
Eastern Health District sample [1] (middle year)	60.1	52.1	.3	32.7	57.9	78.8	81.3	84.0	77.8	60.9
Baltimore, 1940	60.1	52.1	1.2	25.7	60.2	75.1	79.9	81.3	76.6	60.0
Middle Atlantic cities [2] over 100,000	58.5	48.3	.6	17.0	53.9	72.4	79.7	81.7	77.1	60.8
C. C. M. C.[3] cities over 100,000	74.6	68.5	.6	24.0	80.0	92.8	94.4	94.8	93.1	73.3
United States, 1940	61.3	52.3	1.5	26.1	62.1	77.3	82.8	83.1	78.7	63.8
Females:										
Eastern Health District sample [1] (middle year)	58.9	59.0	10.7	53.7	75.0	76.2	74 3	74.7	60.3	28.4
Baltimore, 1940	57.6	59.7	9.3	49.5	72.1	78.0	78.3	70.7	54.3	26.9
Middle Atlantic cities [2] over 100,000	55.5	54.2	4.1	36.4	65.5	74.7	77.8	73.0	58.4	30.8
C. C. M. C.[3] cities over 100,000	67.6	68.4	4.3	49.8	83.3	87.5	86.6	82.9	57.1	28.2
United States, 1940	61.2	60.9	10.7	50.3	74.1	80.7	81.8	76.9	63.8	34.8

[1] Sample of the original Eastern Health District which included wards 6 and 7 only. Population 15 years old and over: E.H.D. sample 4,853; Baltimore 552,081; Middle Atlantic cities 100,000+, 4,184,782; C. C. M. C. cities 100,000+, 8,732; total United States 89,303,719.

[2] Exclusive of New York City. White only for Buffalo, Jersey City, Newark, Camden, Philadelphia, Pittsburgh, and Erie; data for other 5 cities are for total populations but percentages colored are not large.

[3] Committee on the Costs of Medical Care data for 9,000 families: percentages are based on full-time years of life but all of the families and nearly all of the individuals were observed for the full 12-month study period.

The mean size of family in the sample was 3.64 persons as compared with 3.59 for the whole original Eastern Health District, and 3.40 for the total of Baltimore. Table 4 shows the distributions of families according to size in the various cities and groups.

In other respects such as economic, occupational, and educational status, the Eastern Health District could not be said to be representative of Baltimore as a whole. It is a moderate residential district in which nearly three-fourths of the gainfully employed are in the clerical-sales, skilled, and semiskilled occupation groups.

Of the canvassed sample of persons who were under observation in the third or middle study year, 60 percent of the family heads were born in Baltimore, 17 percent elsewhere in the United States, and 23 percent were foreign-born.

Housing is quite uniform throughout the district, of the typical row-house type built up to the front line on a narrow lot with no play space in the front except the sidewalk and street, and little space

Table 4. *Size of family in the white population of the original Eastern Health District*[1] *and in other white population groups*

Population group	Average number of persons per family		Percentage of families[2] with specified number of persons								
	Mean	Median	1	2	3	4	5	6	7	8	9 and over
Eastern Health District sample (middle year)	3.64	3.30	5.6	23.8	25.6	18.9	11.9	7.3	4.0	1.5	1.4
Eastern Health District total, 1940	3.59	3.30	7.3	24.4	23.0	19.3	12.2	6.8	3.6	1.8	1.8
Baltimore, 1940	3.40	3.09	10.1	26.1	23.4	17.8	10.4	5.6	3.4	1.4	1.8
U. S. cities over 100,000, 1940	3.26	2.97	11.6	27.6	22.9	17.8	9.9	5.1	2.5	1.2	1.3
U. S. total, 1940	3.48	3.15	9.9	25.7	22.3	17.9	10.7	6.1	3.4	1.9	2.1

[1] Original Eastern Health District included wards 6 and 7 only.

[2] Number of families: E.H.D. sample, middle year 1,650; E.H.D. total 12,561; Baltimore, 189,660; U. S. cities 100,000+, 10,045,680; U. S total, 32,653,000.

back of the house. According to a scale of adequacy of rooms (see reference 6 for details) which takes into account the age and sex of members of the household, 40 percent of the homes had more than an adequate number of rooms and another 28 percent had adequate space. However, 22 percent of the houses were unsatisfactory by this scale and an additional 10 percent were very unsatisfactory. As might be expected, larger families had the highest percentages with unsatisfactory housing; for families of one or two persons, 80 percent of the houses were adequate or better, as compared with 61 percent for families of five or more persons. To reverse the statement, only 20 percent of the small families were living in houses that were unsatisfactory or worse, as contrasted with 39 percent of the large families.

In the middle study year, 49 percent of the families in the sample owned their homes, with an estimated mean value of $2,790; the other 51 percent were renters with a mean rental of $23.27 per month. Sixty-two percent of the owned houses were valued between $2,000 and $4,000; 71 percent of the rented houses rented for $15 to $30 per month. Of all the dwelling units, 57 percent were houses and 43 percent were apartments. Sixty-eight percent of the houses and 24 percent of the apartments were owned. A house occupied by two or more families who maintained separate quarters and separate eating arrangements was counted as two or more apartment dwelling units.

Of the known annual family incomes for the middle study year, 67 percent fell between $1,000 and $2,500; 18 percent were less than $1,000, including 4 percent on relief, and the other 15 percent exceeded $2,500. The mean annual family income was $1,718. However, family income was not obtained for 17 percent of all families under observation in the middle study year, so the income distribution given above must be looked upon as a very rough approximation. Also, in considering the economic level of the Eastern Health District sample, it should be remembered that the general wage and price levels have increased greatly since 1940.

Of persons 15 years old or over in the sample, 87 percent of the males and 33 percent of the females were in the labor force[4] in the third or middle study year. Of the males and females 15 years old and over in the labor force, 92 and 81 percent, respectively, had full-time jobs; 3 and 8 percent had part-time jobs; and 5 and 11 percent, respectively, were seeking work, including 1.2 and 0.6 percent who were on work relief.

Of the males in the Eastern Health District sample who were working full or part time and who reported an occupation, 25 percent were skilled craftsmen and 33 percent were semiskilled operatives, as against 23 and 22 percent in Baltimore as a whole. On the other hand, the Eastern Health District sample had only 26 percent who were in the dealer, managerial, professional, clerical, and salesmen classes, as contrasted with 41 percent for the whole of Baltimore and 39 percent for urban Maryland except Baltimore. Other categories for males and females may be seen in table 5.

Table 5. *Percentage of white persons 14 years old*[1] *and over in broad occupation groups—Baltimore Eastern Health District sample*[2] *as compared with other areas*

Occupation	Both sexes				Male				Female			
	Baltimore, Eastern Health District sample	Baltimore city 1940	Maryland, urban except Baltimore 1940	Total United States 1940	Baltimore, Eastern Health District sample	Baltimore city 1940	Maryland, urban except Baltimore 1940	Total United States 1940	Baltimore, Eastern Health District sample	Baltimore city 1940	Maryland, urban except Baltimore 1940	Total United States 1940
All occupations, except farm	100	100	100	100	100	100	100	100	100	100	100	100
Dealers, managerial, professional, except farmers	10.2	18.5	19.3	20.7	11.0	19.0	20.1	21.0	8.0	17.0	16.9	19.7
Clerks, salesmen	20.1	27.2	23.0	22.2	15.4	22.2	18.6	17.7	32.6	40.1	34.9	34.0
Skilled craftsmen, foremen	19.0	17.0	17.0	14.7	24.7	22.7	22.8	19.9	3.5	2.0	1.3	1.1
Operatives, semiskilled workers	33.1	22.6	25.8	23.2	32.5	21.6	24.9	24.0	34.9	25.3	28.1	21.1
Domestic workers	1.2	1.1	2.1	3.3	------	.1	.1	.2	4.5	3.8	7.3	11.3
Service and protective workers	9.9	7.7	7.1	8.7	7.5	6.6	5.8	7.5	16.4	10.8	10.5	11.9
Laborers, except farm	6.5	5.9	5.8	7.2	8.9	7.7	7.6	9.6	.1	.9	1.0	.9

[1] Eastern Health District sample includes only 15 years old and over. Persons without occupations and a few in the labor force with unknown occupations are excluded. Numbers with known occupations were: males 2,009; females 749.

[2] Eastern Health District sample represents occupations for third (middle) study year.

The average years of formal education usually varies greatly with age (7). The following summary includes household heads and other adults over 20 years of age who were not currently in school. Of the persons in this group, 3.0 percent had no formal schooling, 29.1 percent completed only the 6th grade or less, and 36.4 percent completed the 7th or 8th grade but did not enter high school. Thus, 68.5 percent did not go beyond the grade school. Of all adults, 25.2 percent entered high school and 8.6 percent completed the 4-year high-school course but did not go beyond high school. However, 1.5 percent of of all adults entered college, but only 0.3 percent finished the 4-year course. In addition, 1.4 percent entered vocational school, 2.1 business school, and 0.9 percent entered some type of professional school. The other 0.4 percent attended special classes of some kind or night school.

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[4] Of persons 15–64 years of age, 91 percent of the males and 35 percent of the females were in the labor force.

Methods of Collecting and Tabulating the Data

Collection

The Public Health Service and various cooperating agencies have made a number of studies of morbidity in different districts (*1, 2, 3, 11, 13, 15, 16*). The Baltimore study is of the periodic canvass type. Families were visited at monthly intervals to obtain a record at each visit of illnesses that had occurred since the preceding visit. In some studies of the periodic type carried on or participated in by the Public Health Service, the visits to the family have been irregular, with some intervals between visits as long as 3 or 4 months and with no attempt to canvass the families at intervals of less than 2 months.

In two studies (*15, 16*), because of weather, road conditions, and shortage of personnel, intervals between visits became so irregular that the data were tabulated in a way to show how much decrease there was in the recorded case rates as the interval between visits was lengthened. Figure 1 illustrates the result in terms of the ratio of the rate of illness found in the second, third, fourth, and fifth months preceding the visit, to the rate found in the first month preceding the visit. Figure 1 shows only illness from all causes, but the cases are classified into those that involved 1 or more days of disability (inability to pursue usual activities), those that caused the patient to be confined to bed for 1 or more days, and nondisabling cases.[5]

For example, in Cattaraugus County (*15*) the data for the third month prior to the visit indicated a case rate (all cases) that was only 45 percent of the rate during the first month prior to the visit. For bed and disabling cases one would expect a better record; the bed cases in the third month prior to the visit indicated a rate of 67 percent of that during the first month prior, and the disabling cases indicated a rate of 61 percent. As would be expected, nondisabling cases fell off most rapidly, the rate for the third month being only 33 percent of

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[5] To avoid error from the fact that the longer intervals between visits occurred more frequently in the winter than in the summer, the ratios shown in figure 1 are based on a simple average of four quarterly rates (annual basis) which gives the winter and summer months equal weight regardless of the irregular frequency of long intervals in different seasons.

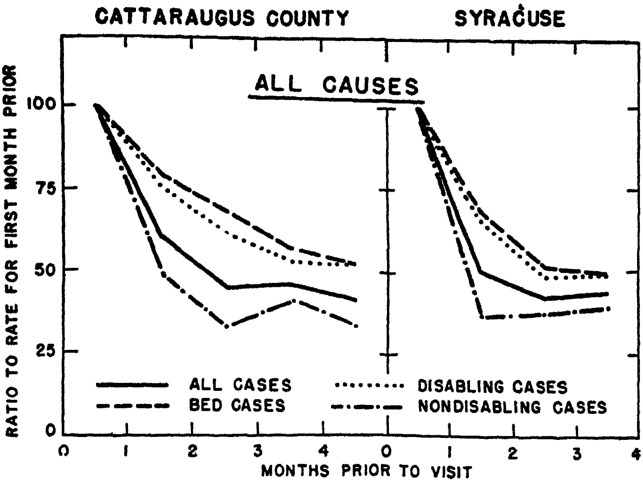

Figure 1. Ratio (percent) of recorded case incidence from all causes in different months prior to the interview, to the case incidence for the first month prior to the interview—house-to-house surveys of illness in New York State. (Rates corrected for seasonal variation. On this chart zero on the horizontal scale represents the day of the interview and the rate for the first month prior is plotted midway between 0 and 1 month; similarly, the second month prior is plotted midway between 1 and 2 months; etc.)

the rate for the first month prior to the visit. After the third month the level of recorded cases seems to remain fairly constant.

The right half of the chart indicates that the same situation existed in Syracuse (*16*), except that the drop in case rates was more rapid.

Because of this loss of cases as the time covered by a visit became more remote, the data for the Baltimore study were collected by rather regular monthly visits. This does not mean that each family was visited on a given day of the month, but within limits each one was visited at intervals of approximately 30 days.

The observed time for each family was counted from the date of the first visit to that family to the time that it moved out of the study area or to the end of the study, whichever occurred first. When one or more visits to a family were missed after they had been enrolled in the study, the illness data were recorded and counted only for the 30 days prior to the next visit. Missed visits were so few that the illness record for most of the families was continuous for the time under observation.

Tabulation

The field schedule was very detailed, and several different kinds of illness rates can be obtained from it. Among other items, the data were so recorded that new cases of illness (onset within study) could be counted and separated from cases present during study but having their onset prior to the person's entrance into the study. Moreover, the prevalence of illness at each monthly visit could be obtained from the schedule. For these various types of illness, medical care was recorded to show the date the care was received, how many office and home calls were made by each type of practitioner or specialist, and if hospitalized, the type of hospital and how many days the patient spent in the hospital. These and other facts about illness, as well as facts about dental and eye care, and preventive services such as medical examinations and immunizations of various kinds, were recorded on a series of punchcards from which tabulations were made.

For nonattended cases, the diagnosis given by the family informant was used in the tabulations. For all cases that had the attendance of a physician (including all clinic and hospital cases) the medical attendant was asked to check or correct the diagnosis; the diagnosis given by the medical attendant was used in the tabulation. The medical attendants were very cooperative so the diagnoses of attended cases were fairly well checked. Some of the nonattended cases were chronic diseases which had been diagnosed earlier and the patient in many instances probably repeated the diagnosis given by the doctor.

The 6th edition of the International Statistical Classification of Diseases, Injuries, and Causes of Death (*17*) was not available at the time of the diagnosis coding in this study, so the code published as Public Health Service Miscellaneous Publication No. 32 (*12*) was used. It is similar to the World Health Organization code and many categories are identical, but code numbers here given are those of the Public Health Service code. In the absence of any physician's designation of the most important cause of the illness, the one selected as of primary importance was the one which usually caused the greater amount of disability or medical care.

In the tabulations of specific causes of illness, such as measles, scarlet fever, influenza, heart disease, asthma, nephritis, and pneumonia, the sole, primary, and contributory causes[6] were all counted. Care was taken not to count symptoms as cases unless no other diagnosis was available. A cold with fever, headache, and aching of limbs was coded as one diagnosis only (cold), but headache appearing as a sole diagnosis was used as a case. Furthermore, a cold in the head, throat, and chest was coded as a single diagnosis, and not as three different diagnoses. Influenza and pneumonia were coded as two diagnoses (pneumonia being an important complication and a distinct disease entity in itself), but influenza with coryza and bronchitis was coded as a single diagnosis because the latter two conditions frequently accompany influenza.

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[6] The terms here used have the following meanings: Sole refers to a case with only one diagnosis; primary means the original or the more important of 2 or more diagnoses; contributory or secondary means the diagnosis of lesser importance or the diseases occurring after the primary cause for a case with 2 or more diagnoses.

On the other hand, broad groups such as respiratory, digestive, and communicable diseases include only cases with a sole cause (diagnosis) plus those represented by the primary of two or more causes or diagnoses. In counting all illnesses, the same method was used. Thus, an illness is considered to have a specific duration regardless of the number of diagnoses involved, as contrasted with a count of all diagnoses involved in the illness.

For specific diagnoses (which include sole, primary, and contributory causes), days of disability and of confinement to the house or bed include days attributed to both primary and contributory diagnoses. On the other hand, days for broad diagnosis groups and for all causes combined relate to the diagnoses that were the sole or primary causes of the illness, without duplication of any kind.

Days of disability and days confined to the house or bed refer in this study to those within the period of observation—the only figure that could be obtained accurately. To eliminate the incomplete cases (onset prior[7] or still sick at end of observation) would make for a shorter mean duration per case, since it would leave only cases with both onset and termination within the period of observation.

Contributory diagnoses in this study comprised only 4.5 percent of all diagnoses, including both disease and injury. With this low frequency of contributory causes, the selection of the principal diagnosis and the method of handling contributory causes were not of great importance; in hospital and mortality data in which the numbers of contributory diagnoses are large, the selection of the primary cause is a very important problem.

The cases were divided into four severity categories, each type including all the more severe types:

(a) All cases, including disabling and nondisabling.

(b) Disabling cases (1 day or longer), including those confined to the house and to bed. Disability is defined here as inability to pursue usual activities such as working, attending school, doing housework, or pursuing other usual activities.

(c) Cases confined to the house (1 day or longer), including confined to bed. All such cases are considered as disabling also.

(d) Bed cases (1 day or longer) are defined as cases confined to bed, including confined to a hospital. All such cases are considered as confined to the house and also as disabling.

There were some cases with series of days in which the patients (particularly housewives) were confined to the house and able to do only the work that was absolutely necessary; they were thus disabled for parts of days only and virtually confined to the house. These cases entered as "partially disabling" and other cases indicated as "partial house" were counted as disabling and house cases, respectively; they constituted about 5 percent of the total cases of those respective categories. However, no "partial bed" cases were counted as bed cases unless they were confined to the house for 7 whole days or longer; the "partial bed" cases tabulated as bed cases amounted to about 8 percent of the total bed cases. In terms of days, "partial disability" and "partial house" cases were counted as 1 day of disability or house, respectively, and "partial bed" cases (so far as used) were counted as 1 day in bed.

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[7] Prior onset means prior to the time that the particular person came under observation.

These various criteria for separating cases according to severity can be applied to persons of all ages except infants under 1 year of age who normally spend a considerable part of each day in bed. To be able to carry these four severity categories to all ages, infants were classified as follows:

Cases with one or more home calls or two or more office calls by or to a doctor on account of illness, or with 1 or more days in a hospital were counted as disabling cases and also as cases confined to the house.

Cases with one or more home calls or one or more days in a hospital were counted as bed cases.

For the above cases, days with one or more calls by or to a doctor on account of illness were counted as disabling days and also as days confined to the house. Days with one or more home calls by a doctor and all hospital days were counted as days in bed.

Comparison of Illness Rates

Data for 3-Year and 5-Year Blocks

As noted above, some of the illness data refer to families in city blocks kept under observation for 3 years only, and some are for blocks observed for the whole 5 years. To see more accurately how the rates for the 3-year blocks compare with those for the 5-year blocks, the two sets of data have been plotted in figure 2 to show the prevalence of illness (sick persons) on the day of the visit per 1,000 persons observed for each calendar month of the study. The disabling and total rates of the various kinds shown in figure 2 are plotted on scales so arranged that the approximate average rate per 1,000 for the whole 5-year period plots at the same distance from the base line in all charts. Thus the monthly fluctuations around this average rate are comparable for the various diagnosis categories. The 3-year rates are plotted on the same actual scales as the 5-year rates, so the differences for a given diagnosis category as between the rates for the two groups of blocks are actual.

Considering the prevalence of acute respiratory and acute nonrespiratory illness, it is seen in figure 2 that the rates and their monthly fluctuations are reasonably similar for the 3- and 5-year blocks.

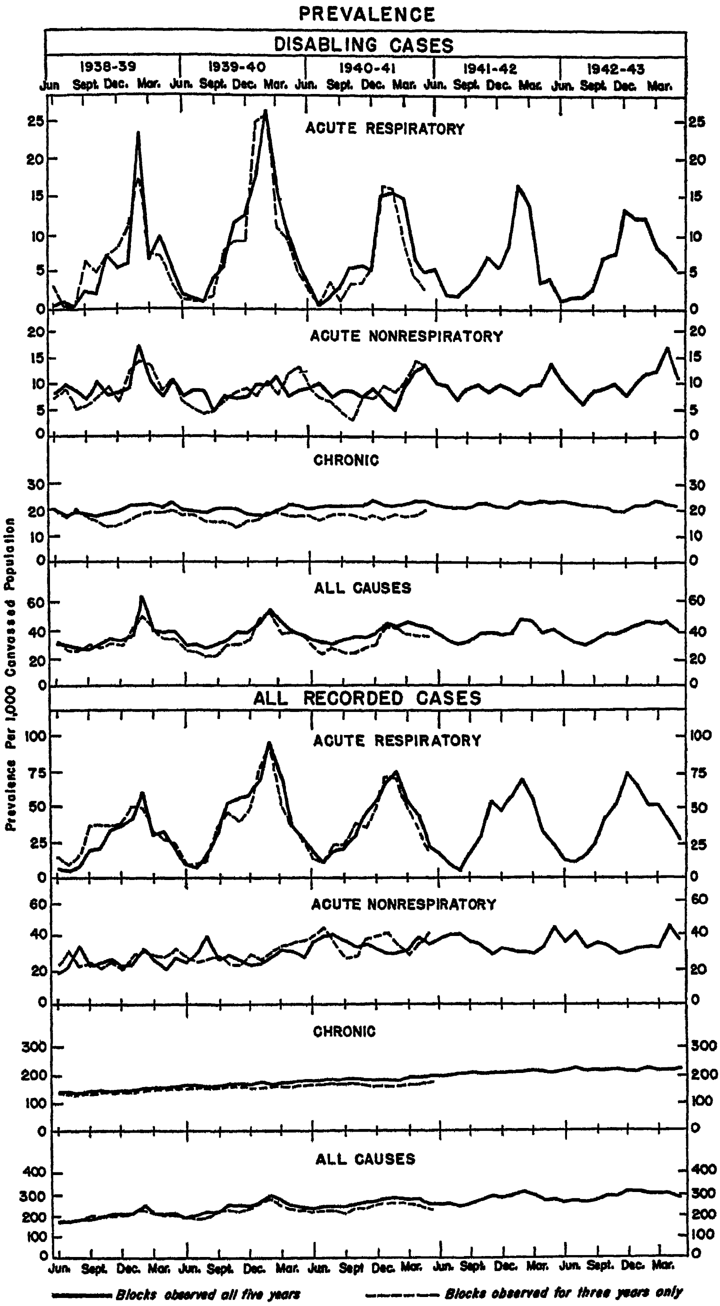


Figure 2. Monthly prevalence per 1,000 canvassed population of disabling and of total cases of certain broad diagnosis groups in 18 blocks canvassed for 3 years, and in 17 blocks canvassed all 5 years—Baltimore Eastern Health District sample, 1938–43.

In the whole 5-year period, there is a rather definite upward trend in the prevalence of the total chronic cases, starting at about 133 per 1,000 in June 1938 and terminating at 222 per 1,000 in May of 1943. The upward trend is not so clearly evident in disabling chronic cases (19.9 to 22.0 per 1,000). In both the total and disabling chronic cases, the upward trend is somewhat less for the 3-year blocks than for the first 3 years of the 5-year blocks. The effect of these differences in chronic case rates is reflected also in the trends for all causes of illness. In spite of these variations, the prevalence of illness in the 3- and 5-year blocks seems rather similar

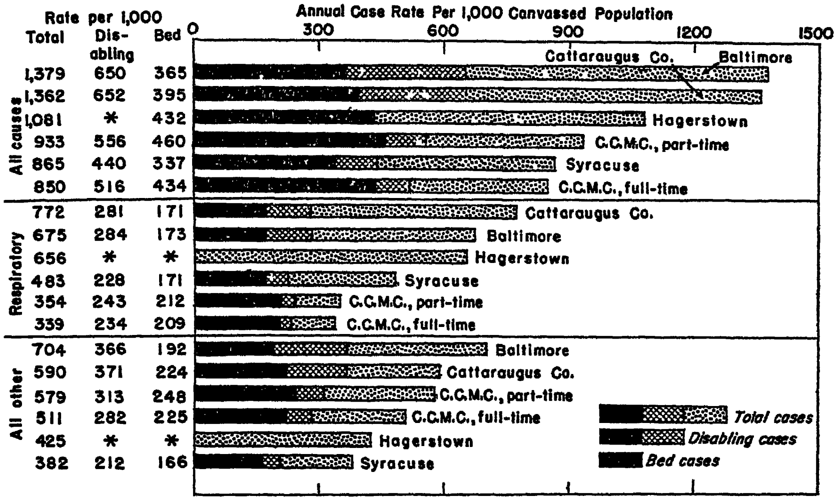
It is apparent that the prevalence rates for acute respiratory diseases show the greatest variation from month to month, the relative variability being greater for the disabling than for the total cases of this diagnosis group. The disabling acute respiratory cases and to some extent the total cases of the same diagnosis group indicate epidemics with peaks in February of 1939 and in the same month of 1940. The whole peak of the latter epidemic seems to be accounted for by the acute respiratory diseases, but the February 1939 peak shows up in the acute nonrespiratory cases as well as in the respiratory group. Reference to the reports of communicable diseases by attending physicians to the Baltimore City Health Department indicates that a measles epidemic was in progress at the same time as the minor influenza epidemic of 1939. The number of cases reported to the Health Department in February of 1939 was far greater for measles than for influenza. However, in the canvassed population the prevalence of acute disabling respiratory diseases (including influenza) in February of 1939 was 28 percent higher than that of acute disabling nonrespiratory diseases (including measles), with a peak in the latter group largely due to the measles epidemic. The other 3 survey years (June 1940–May 1943) do not appear to include any respiratory epidemics. Epidemics of respiratory disease are important in a study of illness because they are a major factor in the year to year variation in the annual case rates from all causes.

Comparison With Other Surveys

The six illness studies (fig. 3) considered in this comparison were all periodic canvasses of families over a period of 1 year or longer. The intervals between visits to the households and other survey techniques varied considerably from study to study; however, in all six studies an attempt was made to record nondisabling illness as well as cases disabling or in bed for 1 or more days. Single visit surveys covering a whole year and recording only the more severe cases such as those disabling for a week or longer, as well as surveys covering less than a 12-month period, were excluded. Most important surveys in these latter categories are the National Health Survey of

1935–36 and the Health and Depression Study covering a 3-month period in the spring of 1933.

Figure 3 shows annual case rates for all causes, all respiratory diseases, and all nonrespiratory diseases in each of the six surveys of the periodic type. Although there are large variations from survey to survey in the total recorded cases of all causes and also in the two broad diagnosis subgroups, there is less variability in disabling cases and considerably less in cases confined to bed for 1 day or longer. Thus, it appears that case rates for the more severe bed cases do not vary greatly so far as all causes and all respiratory and nonrespiratory groups are concerned.



** Data not available for Hagerstown*

Figure 3. Comparison of illness rates per 1.000 canvassed population as recorded in six illness surveys made by periodic visits to families in given districts. (Data for Cattaraugus County (*15*) and Syracuse (*16*) include only cases occurring in the month of the survey and the first and second months prior to that month. The other surveys included very few long intervals between visits. C. C. M. C., full-time (*1*), refers to families kept under observation the whole 12 months; a separate study was made of families who dropped out earlier but in other respects were a part of the same study (*1*), footnote 21, Pub. Health Rep. 55: 67, (1940). C. C. M. C.=Committee on Costs of Medical Care. For Hagerstown study, see reference *11*.)

Influenza epidemics do not appear to account for any large part of the variation in rates from survey to survey. There was during the study periods one minor influenza epidemic in Syracuse and two minor epidemics in each of Baltimore, Cattaraugus County, and Hagerstown, with somewhat higher rates than in Syracuse. Each of the two Medical Care Survey groups had a moderate influenza epidemic. With illness rates plotted by weeks or even months, as in figure 2, the epidemic periods stand out with very high rates and even affect the rate for the year as a whole. However, illness rates in studies over 2- to 5-year periods, as in these data, are not greatly affected by minor influenza epidemics. Probably a more important factor in the high rate for the 3-year study in Cattaraugus County was the exceptionally good cooperation in reporting in this rather isolated rural farm area, as compared with that among city dwellers who are frequently bothered by door-to-door salesmen. The high rates in Baltimore were probably due to frequent visits as well as good cooperation, but in the Cattaraugus County and Syracuse studies no observation or case data were used for periods more than 3 months back of a visit, and in the other studies few of the visits were made at intervals of more than 2 to 3 months. As noted above, the variation in rates from survey to survey was considerably less for disabling and, particularly, bed cases than it was for nondisabling cases for which the variation in the completeness of reporting was greatest.

Illness in the Canvassed Sample of Families in Baltimore

The Eastern Health District canvassed sample, including both the 3- and 5-year blocks, affords a total full-time person-years of observation of 21,505, with a total annual incidence of illness from all causes of 1,379 cases per 1,000 population.[8] Of this total, 729 cases per 1,000 population or 53 percent of the total cases were nondisabling; the other 650 cases per 1,000 were disabling for 1 or more days. Of the disabling cases, 595 per 1,000 population, or 91 percent, were confined to the house for 1 or more days, and 56 percent were confined to bed for 1 or more days during the illness, a rate of 365 bed cases per 1,000 population. Finally, there were 15.8 disabled days per person-year of observation and 24.4 disabled days per disabling case. These figures refer to all causes of illness, including accidents, although the present paper is largely confined to diseases.

The acute diseases as presented in this paper include a few cases with onset prior to the study; table 6 gives for each diagnosis the total cases and the numbers with prior onset, which means prior to the entrance of the particular patient into the study. Chronic disease cases include disabling attacks with onset of disability within the study year and also chronic cases without disability during the entire period of observation, regardless of time of onset.

Of the annual rate of 1,379 total cases per 1,000 population (including attacks of chronic diseases) from all causes, only 54 cases per 1,000 had an onset prior to the observation period. However, in other cases disabling attacks or nondisabling experience with the chronic disease may have occurred prior to the period of observation.

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[8] Rates for all causes are exclusive of any diagnoses classified as contributory. In this study such associated contributory causes are counted in the rates for each specific diagnosis but are not counted as independent cases in the total for all causes.

In a study of this kind, information about detailed diagnoses gives a better picture of the basic data than broad groups. The data in the present report are, therefore, classified into rather specific causes, but the charts show an array of detailed diagnoses for a given broad diagnosis group. The charts include three types of rates, some of which are subdivided into disabling, confined to the house, and confined to bed, shown by the type of hatching on the bars. The three broad types of rates referred to are:

(a) Annual case rates. With the exception of a few cases with onset prior to the study they represent incidence rates. These rates are based on a count of the number of cases of a given diagnosis and, particularly for acute diseases, are the type of data with which the epidemiologist deals. In terms of the spread of a communicable disease, a mild case or even a carrier may be as important as a severe bed or hospital case.

(b) The annual number of days of disability per 1,000 canvassed population. This type of rate is of interest to industrial and school authorities, because it indicates the importance of the disease in terms of inability to work, attend school, or pursue other usual activities. According to this measure, the large number of the minor respiratory cases becomes less important because of the short disabling duration per case. The few cases of cardiovascular and mental diseases become more important because of their long periods of disability.

(c) The days of disability per disabling case. This average represents the importance of the disease to the individual patient. A severe disease may be so rare that even with a long duration it is of relatively little importance to the community, but to the individual who contracts such a disease it is of tremendous importance.

To summarize, the three types of charts have to do with: (1) the importance of specific diseases to the community in relation to preventive and therapeutic measures; (2) the importance in terms of time lost from work or school; and (3) the importance of the disease to the individual patient in time lost per case. Table 6 shows numbers of various kinds of cases and rates for the detailed diagnoses that are shown in the charts.

Figure 4 shows recorded annual case rates per 1,000, both disabling and nondisabling. The total length of the bar represents the total case rate of this kind; the black portion represents the rate for cases that caused disability for 1 or more days during the study. In terms of either total or disabling cases in this study, as in preceding studies, the most frequent diagnoses are invariably the minor respiratory diseases including influenza, coryza and cold, bronchitis, tonsillitis, sore throat, laryngitis, and other diseases of the larynx, chiefly nondiphtheritic croup. In this study these minor respiratory cases accounted for 47 percent of all cases of illness and accident, 39 percent

Table 6. *Cases of illness and days of disability due to each detailed diagnosis among canvassed white families—Eastern Health District of Baltimore, Md., 1938–1943*

Diagnosis[1]	Cases[3] per 1,000 person-years observed					Days[3] per 1,000 person-years observed			Days disabled[3] per disabling case	Number of cases								
										Sole, primary and contributory				Contributory				Total onset[4] prior[5]
										Onset[4] within, and prior[5]				Onset[4] within, and prior[5]				
	Total	Non-disabling	Disabling	Confined to—		Disabling	Confined to—			Total	Disabling	Confined to—		Total	Disabling	Confined to—		
				House	Bed		House	Bed				House	Bed			House	Bed	
Minor respiratory diseases:																		
Influenza and grippe (430)	72.08	5.77	66.31	65.89	55.38	631.2	556.0	297.9	9.5	1,550	1,426	1,417	1,191	25	24	24	23	12
Bronchitis (479)	215.11	123.46	91.65	88.21	48.41	682.4	563.0	189.2	7.4	4,626	1,971	1,897	1,041	110	66	65	43	99
Coryza and cold (440)	240.18	197.12	43.06	41.25	15.95	190.6	172.1	44.3	4.4	5,165	926	887	343	121	54	52	34	70
Tonsillitis (460)	19.44	3.72	15.72	15.25	10.79	145.2	125.4	50.6	9.2	418	338	328	232	20	15	15	8	8
Sore throat (461, 466)	101.70	57.34	44.36	43.20	22.55	260.8	231.1	82.7	5.9	2,187	954	929	485	65	46	45	28	38
Laryngitis (467)	7.67	4.74	2.93	2.79	1.49	20.6	17.8	4.3	7.0	165	63	60	32	3	2	2	2	1
Other diseases of larynx (469)	2.56	.84	1.72	1.63	.60	12.4	7.6	2.5	7.2	55	37	35	13	------	------	------	------	4
Other respiratory diseases:																		
Sinusitis (495)	8.70	4.56	4.14	3.81	1.95	28.7	19.6	7.8	6.9	187	89	82	42	24	6	5	3	26
Chronic bronchitis (471)	2.00	.79	1.21	1.02	.74	27.3	16.9	9.0	22.6	43	26	22	16	12	------	------	------	14
Pneumonia (481–489)	8.65	.14	8.51	8.51	8.28	273.0	222.5	155.9	32.1	186	183	183	178	15	15	15	15	5
Pleurisy (490–493)	2.65	.33	2.33	2.28	2.05	52.1	35.8	26.5	22.4	57	50	49	44	4	4	4	4	1
Tonsillectomy (450)	12.18	.05	12.14	12.09	12.04	109.9	83.6	55.0	9.1	262	261	260	259	3	3	3	3	1
Other respiratory (496, 499, 503–509)	1.35	.93	.42	.42	.37	6.8	5.6	5.3	16.2	29	9	9	8	6	1	1	1	7
Allergy and related disorders:																		
Asthma (501)	9.39	3.07	6.32	5.44	3.02	168.2	41.5	18.0	26.6	202	136	117	65	4	2	1	1	8
Hay fever (500)	9.30	8.97	.33	.28	.09	.6	.6	.1	1.7	200	7	6	2	1	1	1	------	15
Eczema (710)	3.44	3.02	.42	.33	.05	7.2	2.5	.1	17.1	74	9	7	1	1	------	------	------	7
Urticaria (714)	4.00	2.88	1.12	.98	.33	4.1	2.9	.9	3.7	86	24	21	7	6	3	3	2	3
Other allergy (791–793)	4.00	3.02	.97	.88	.46	13.3	4.3	1.9	13.6	86	21	19	10	3	2	2	2	4
Dermatitis venenata (718)	7.07	5.77	1.30	.74	.23	10.0	5.6	1.7	7.7	152	28	16	5	1	1	------	------	3
Infectious and parasitic diseases:																		
Measles (013)	16.04	.37	15.67	15.62	14.37	211.6	190.7	98.6	13.5	345	337	336	309	8	8	8	8	1
German measles (014)	16.09	.56	15.53	15.21	7.16	89.8	78.2	26.5	5.8	346	334	327	154	2	2	2	2	1
Whooping cough (011)	8.56	4.09	4.46	3.67	1.44	125.0	61.2	14.1	28.0	184	96	79	31	7	7	7	7	7
Mumps (016)	4.19	.05	4.14	4.05	2.74	36.8	34.6	11.3	8.9	90	89	87	59	1	1	1	1	3
Chickenpox (015)	9.11	.65	8.46	8.32	3.58	118.6	107.9	13.9	14.0	196	182	179	77	10	5	5	1	------
Scarlet fever (010)	1.40	------	1.40	1.40	1.35	33.0	31.9	19.6	23.6	30	30	30	29	1	1	1	1	1
Tuberculosis (all forms) (020–039)	3.12	.42	2.70	2.51	2.37	812.8	427.1	376.3	301.4	67	58	54	51	1	------	------	------	20
Syphilis (all forms) (060–069)	2.56	1.44	1.12	.88	.65	139.8	21.0	18.2	125.3	55	24	19	14	8	1	1	1	27

Dei natophytosis (092)	5.07	3.77	1.30	.79	.14	23.1	10.9	1.7	17.7	109	28	17	3	4	------	------	------	-
Otl r [6] infectious (001-008, 012, 040-059, 07 -091,093-099)	4.28	2.47	1.81	1.63	.88	32.1	21.1	12.9	17.7	92	39	35	19	3	2	2	1	2
Rea tion to smallpox vaccination (790)	2.88	1.07	1.81	1.72	.79	7.1	6.6	2.7	3.9	62	39	37	17	4	3	3	2	------
Noni fectious general diseases:																		
Ma gnant neoplasm (100-169)	3.35	.19	3.16	3.07	2.70	229.0	157.2	112.4	72.4	72	68	66	58	1	------	------	------	12
Ben gn neoplasm and cysts of female ge iital organs (170-179, 657, 667)	2.33	.28	2.05	2.00	1.91	109.7	78.0	32.1	53.6	50	44	43	41	6	6	6	5	9
Oth r benign neoplasm (181-199)	2.28	1.21	1.07	.93	.60	21.7	9.1	7.2	20.3	49	23	20	13	3	3	2	2	3
Dia etes (210-219)	2.74	1.40	1.35	1.12	.84	322.0	149.6	26.0	238.8	59	29	24	18	12	------	------	------	32
Dis ases [7] of thyroid and parathyroid gl nds (220-232)	3.07	.74	2.33	2.14	2.00	53.3	42.6	40.2	22.9	66	50	46	43	4	------	------	------	16
Ane nia [8] (250-269)	2.84	1.07	1.77	1.67	1.44	110.6	59.3	24.5	62.6	61	38	36	31	9	8	8	7	6
Nut itional diseases [9] (240-247)	2.28	1.44	.84	.84	.51	15.6	14 0	4.9	18.6	49	18	18	11	7	4	4	2	
Chr nic poisoning (270-279)	1.12	.42	.70	.47	.37	2.5	1.3	1.0	3.6	24	15	10	8	2	1	1	1	2
Disea es of nervous system:																		
Net itis and neuralgia (316, 337, 784)	7.58	4.14	3.44	2.98	1.49	28 2	12 9	4.4	8.2	163	74	64	32	7	1	1	1	9
Intr ranial vascular lesions(290-295, 307)	.88	.14	.74	.74	.65	216 3	161.2	35.9	290 7	19	16	16	14	1	1	1	1	8
Ner ousness (786)	10.70	6 84	3.86	2 46	1.26	130.5	20.3	5.5	33.8	230	83	53	27	13	3	3	3	21
Psy honeurosis (330)	5.91	2.14	3.77	2.74	2.00	282.5	191.4	169.8	75.0	127	81	59	43	8	1	1	1	33
Epi epsy and mental deficiency (335-33)	2 33	.84	1.49	.93	.79	1141.3	461.7	411 0	767 0	50	32	20	17	3	1	1	1	40
Psy hosis (320-329)	2.33	.23	2.09	1.72	1.44	943.8	783 8	715.2	451.0	50	45	37	31	1	1	1	1	24
Oth r nervous (280-282, 300-305, 309-31 , 319, 334, 339, 787)	3.63	1.86	1.77	1.72	1.26	171.4	113.5	42 9	97.0	78	38	37	27	14	9	9	7	23
Disea es of eye and annexa:																		
Infl mmation of conjunctiva and eyelid (3 7)	14.28	11.25	3.02	2 65	.60	19 2	12 0	2 7	6.3	307	65	57	13	19	4	4	2	2
Oth r eye diseases (340-346, 348-349)	5.58	3.44	2.14	1.67	1.40	177.2	22 3	13.6	82 8	120	46	36	30	5	2	2.	1	14
Disea es of ear and mastoid process:																		
Ear che (351)	10 93	4 56	6.37	6.09	2 84	40.3	36.5	9 0	6 3	235	137	131	61	62	48	46	28	3
Oti s media (350)	14.83	4.88	9.95	9.49	6.28	100.8	86.7	37.4	10.1	319	214	204	135	72	55	54	41	12
Oth r ear (352-353, 357)	1.53	1.35	.19	.14	------	.9	.8	------	4.8	33	4	3	------	1	1	1	------	3
Dis ases of mastoid process (359)	.79	.05	.74	.74	.74	34.6	23.7	18.3	46.6	17	16	16	16	1	------	------	------	------
Disea es of heart and circulatory system:																		
Act e [10] rheumatic fever (200-202)	7.11	1.35	5.77	5.21	4.70	755 5	413.1	330.2	131.0	153	124	112	101	1	------	------	------	46
Chi nic rheumatic heart (360-365)	1.49	1.12	.37	.37	.33	2 7	2 4	1 1	7.4	32	8	8	7	4	1	1	1	20
Oth r heart diseases (370, 380-389) [11]	17.16	4.09	13.07	12.00	9.62	1512.6	780.4	230.3	115.8	369	281	258	207	22	4	4	3	87
Hy ertension and arteriosclerosis (390-4( ))	7.63	3.95	3.67	3.16	2.33	494.1	232 0	95 0	134.5	164	79	68	50	27	3	3	3	58
Hei iorrhoids (415)	4.00	2.09	1.91	1.86	1 58	64 1	30 1	19.2	33 6	86	41	40	34	15	4	4	3	12
Var cose veins (410-414)	3.86	2 04	1.81	1.58	1.07	173.1	68 7	14.6	95 4	83	39	34	23	16	1	1	1	44
Lyi iphadenitis and lymphangitis (420)	3.49	1.07	2.42	2 28	1.16	24.5	21.3	8.0	10.1	75	52	49	25	3	3	2	1	------
Oth r circulatory (401-409, 420-424, 429)	7.30	4.70	2.60	2.19	1.44	40.8	27.5	10.1	15.7	157	56	47	31	14	9	9	6	10
Mino digestive diseases:																		
Dig stive disturbance (560-570)	51.76	21.90	20.85	27.95	10.79	87.7	70 3	23.5	2 9	1,113	642	601	232	92	69	67	36	9
Dia rhea and enteritis (009, 530-539)	26.27	11.35	14.93	14.09	5.30	68.6	61.0	26.5	4.6	565	321	303	114	48	29	26	14	4
Othe digestive diseases:																		
Inf cted teeth and gums (510)	20.32	12.65	7.67	6.51	1.86	35 3	24 2	5.0	4.6	437	165	140	40	20	8	7	5	1
Dis ases of mouth (514-517)	2.42	1.67	.74	.65	.33	8.8	2.7	.8	11.8	52	16	14	7	3	1	1	------	1
Ulc r of stomach and duodenum (520-5)	2.84	.56	2.28	2.05	1.67	174.8	38.5	21.9	76.7	61	49	44	36	3	------	------	------	11

Table 6. *Cases of illness and days of disability due to each detailed diagnosis among canvassed white families—Eastern Health District of Baltimore, Md., 1938–1943*—Continued

Diagnosis[1]	Cases[2] per 1,000 person-years observed					Days[3] per 1,000 person-years observed			Days disabled[3] per disabling case	Number of cases								
										Sole, primary and contributory				Contributory				Total onset[4] prior[5]
										Onset[4] within, and prior[5]				Onset[4] within, and prior[5]				
	Total	Non-disabling	Disabling	Confined to—		Disabling	Confined to—			Total	Disabling	Confined to—		Total	Disabling	Confined to—		
				House	Bed		House	Bed				House	Bed			House	Bed	
Other digestive diseases—Continued																		
Appendicitis (540–549)	10.51	.65	9.86	9.58	8.18	190.7	131.7	91.9	19.3	226	212	206	176	28	28	28	28	8
Hernia (550–560)	5.44	2.70	2.74	2.51	2.23	200.0	56.9	40.9	72.9	117	59	54	48	21	------	------	------	51
Cholecystitis and calculus (585–586)	5.39	.42	4.98	4.98	4.14	65.7	54.9	33.8	13.2	116	107	107	89	5	1	1	1	7
Diseases of liver and gallducts (580–584, 587–589)	3.44	1.02	2.42	2.33	1.53	46.9	30.0	7.8	19.4	74	52	50	33	6	2	2	1	12
Other digestive (519, 529, 572–579, 590–599)	8.37	3.95	4.42	4.00	2.60	85.0	42.5	23.9	19.2	180	95	86	56	12	10	10	10	5
Diseases of kidney and urinary system:																		
Nephritis (375, 600–607)	4.56	1.26	3.30	3.16	2.56	459.1	282.2	126.5	139.1	98	71	68	55	9.	3	3	3	25
Pyelitis (610)	2.79	.88	1.91	1.77	1.53	27.3	24.7	18.0	14.3	60	41	38	33	5	2	2	1	4
Other kidney diseases (612 617)	2.23	.70	1.53	1.44	1.26	36.3	15.5	8.2	23.7	48	33	31	27	3	2	2	2	5
Cystitis and calculus (619–621)	2.70	.84	1.86	1.67	1.40	32.8	21.3	14.8	17.6	58	40	36	30	3	2	2	2	5
Other diseases of bladder and urethra[12] (623–629)	.88	.51	.37	.33	.23	3.7	1.6	1.2	10.0	19	8	7	5	1	1	1	1	3
Male genital diseases (nonvenereal):																		
Diseases of prostate (630–639)	1.41	.42	1.02	.42	.37	23.8	10.3	7.7	23.3	31	22	9	8	4	2	1	1	6
Circumcision (642)	3.67	.33	3.35	3.35	2.74	13.0	11.9	9.7	3.9	79	72	72	59	5	5	5	5	1
Other male genital (640, 644–649)	.60	.33	.28	.28	.28	3.0	2.5	2.1	10.8	13	6	6	6	2	2	2	2	------
Female genital and breast diseases (nonvenereal) except tumors and cysts:																		
Diseases of ovaries, oviducts, and parametrium (650)	2.19	.88	1.30	1.16	1.02	20.6	13.6	9.6	15.9	47	28	25	22	9	7	7	7	2
Menstrual disorders (663–664)	20.41	7.16	13.25	11.72	7.07	54.3	25.5	11.3	4.1	439	285	252	152	18	8	8	6	14
Other female genital (652–656, 658–661, 666, 668–669)	6.37	2.98	3.39	3.30	2.93	113.0	84.6	43.2	33.3	137	73	71	63	24	16	15	15	12
Puerperal state:																		
Abortions and stillbirths (674–677, 694–695)	2.23	------	2.23	2.19	2.05	51.7	37.9	26.4	23.1	48	48	47	44	------	------	------	------	4
Live births (670–673)	15.07	------	15.07	15.07	14.97	312.3	278.1	186.0	20.7	324	324	324	322	2	2	2	2	7

Complications of pregnancy and childbirth (680–689, 692–693. 696, 699)	7.44	.51	6.93	6.74	6.18	98.2	77.7	49.3	14.2	160	149	145	133	92	92	92	90	11
Puerperal diseases of breast (690)	.33	.14	.19	.19	.14	1.8	1.6	.7	9.8	7	4	4	3	1	1	1	1	-------
Diseases of skin:																		
Furuncle and carbuncle (700)	10.42	7.77	2.65	1.53	.33	19.3	7.3	1.3	7.3	224	57	33	7	5	1	1	1	4
Cellulitis and paronychia (702, 704)	3 77	2.70	1.07	.70	.28	13.4	5.8	1.2	12.5	81	23	15	6	2	-------	-------	-------	1
Impetigo (711)	4.98	3.44	1.53	1.07	.09	33.9	10.5	.3	22.1	107	33	23	2	2	2	2	1	-------
Other local skin infection (706)	5.81	3.58	2.23	1.49	.65	30.1	19.0	6.6	13.5	125	48	32	14	4	1	1	1	3
Other skin conditions (712–713, 715–716, 719)	19.58	16.37	3.21	2.79	1.26	51.8	26.5	15.3	16.1	421	69	60	27	13	4	4	1	15
Diseases of bones, joints and organs of locomotion:																		
Arthritis and chronic rheumatism (720–729, 783)	19.34	9.48	9.86	8.28	5.30	962.6	355.6	85.5	97.6	416	212	178	114	62	5	5	5	126
Other diseases of bones and joints (730–739)	5.72	3.21	2.51	1.81	1.12	383.2	187.4	33.4	152.6	123	54	39	24	2	1	1	1	17
Lumbago and myalgia (740, 782)	8.65	3.63	5.02	4.09	2.51	38.1	31.7	9.9	7.6	186	108	88	54	5	4	4	4	5
Miscellaneous orthopedic conditions (742–749)	1.35	.98	.37	.19	.05	19.9	3.0	.1	53.5	29	8	4	1	2	-------	-------	-------	5
Congenital malformations and diseases of early infancy (750–779)	2.09	.47	1.63	1.58	1.26	84.9	46.8	30.2	52.2	45	35	34	27	4	4	4	4	5
Other and ill-defined diseases:																		
Headache (785)	27.95	18.88	9.07	8.00	2.51	13.5	11.3	3.6	1.5	601	195	172	54	-------	-------	-------	-------	4
Rash (233–239, 781	4.05	3.44	.60	.51	.14	2.7	1.7	.3	4.5	87	13	11	3	4	2	2	-------	1
Other and ill-defined 789, 797–799)	36.69	25.11	11.58	8.93	3.53	113.9	26.8	9.1	9.8	789	249	193	73	2	-------	-------	-------	10

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[1] Code numbers (in parentheses) are from Manual for Coding Causes of Illness (*12*).

[2] Cases include sole, primary, and contributory causes of illness so are not addable to a total for all causes.

[3] Days of diability include all on sole and primary causes and one-half of those on any contributory causes that are assigned to a given diagnosis. Disability as here used means inability to work in gainful employment or at home, do housework, attend school, or pursue other usual activities for 1 or more days. Similarly "house" and "bed" cases refer to those with 1 or more days confined to the house or bed, respectively. For chronic diseases with disability this table represents the number of disabling attacks with 1 or more days of disability rather than the number of individual patients; similarly house and bed cases represent attacks with confinement to the house or bed for 1 or more days, respectively. For nondisabling chronics, the rate represents the number of individuals with the specified disease. Disabling cases include a few that were disabled for parts of days, particularly for housewives with chores that had to be done even if the rest of the day was spent in bed. A similar method was used for "house" cases and for "bed" cases with 7 or more days confined to the house.

[4] Onset for a nondisabling case means onset of signs or symptoms; for disabling acute cases and disabling attacks of chronic diseases, onset means onset of disability.

[5] Prior means prior to time that the given family came under observation.

[6] Includes the 2 cases of diphtheria (012) that were reported.

[7] Only 6 cases of endocrine (233–239) other than thyroid and parathyroid were reported and they are included in "Other and ill-defined diseases".

[8] Includes the 1 case of blood disease other than anemia.

[9] No cases for "Other noninfectious general" (249) were reported.

[10] Includes 12 cases of history of rheumatic fever and 7 cases of history of chorea.

[11] Except congenital (733), syphilitic (061), and thyrotoxic (222) heart diseases.

[12] Includes 3 cases of other urinary (629).

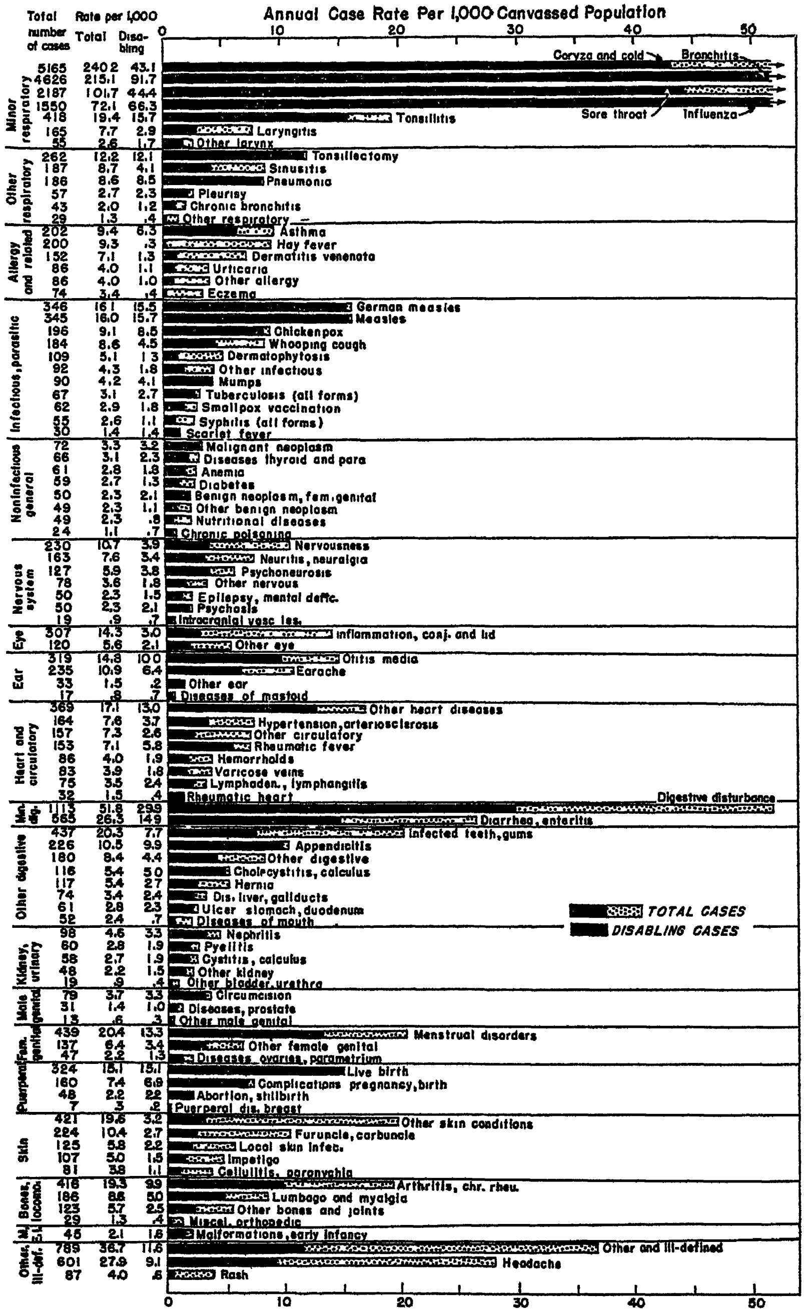

Figure 4. Annual rates per 1,000 canvassed population of total cases and of cases disabling for 1 day or longer for specific diagnoses—Baltimore Eastern Health District sample, 1938–43.

]

of disabling cases, 42 percent of house cases, and 41 percent of bed cases. However, of the total days of disability from all causes, only 12 percent were due to the minor respiratory diseases. The days confined to the house and to bed due to minor respiratory diseases were 17 and 13 percent, respectively, of the total days for all causes of illness and accident of the house and bed categories. Thus, in terms of days, the minor respiratory diseases are much less important than in terms of cases.

The next most numerous causes in terms of total and also of disabling cases are the minor digestive diseases, including digestive disturbance, and diarrhea and enteritis.

Ill-defined diseases including a few others of specific diagnosis constitute only 5 percent of all recorded cases, and the disabling cases of this group constitute only 3 percent of the total disabling cases.

Figure 5 drops from consideration nondisabling sickness and shows only the illness and attacks of chronic disease that were disabling in the sense of interfering with the patient's work, school, housework, or other usual activites. Again the hatchings on these bars divide the illnesses into different severities. Since cases confined to the house or bed for 1 day or longer are all considered disabling, the total length of a bar represents all disabling cases of that diagnosis. The black part of the bar represents bed cases and the black plus the darker hatching represents cases confined to the house for 1 day or longer.

We know of no study which has made use of the category, "cases confined to the house". Considering all causes of illness, 91 percent of the disabling cases were confined to the house and 56 percent were confined to bed for 1 day or longer. However, of the total days disabled, only 59 percent were days confined to the house, and 31 percent were days confined to bed. A careful study of figure 5 indicates that there are not many disabling cases that are not confined to the house for at least 1 day. Thus, confinement to the house may be a better definition of disability among nonworking and nonschool groups than inability to pursue usual activities which is at best a rough measure.[9]

It should be noted in connection with figures 4 and 5 that generally the diagnoses that show high rates in terms of total recorded cases also show high disabling case rates. While there are many differences in the array of diagnoses according to total and disabling cases, the general picture remains about the same; in both types of cases respiratory diseases are the most frequent diagnosis group and digestive, the second most frequent.

On the other hand, a number of skin diseases, minor allergies, and minor communicable diseases show fairly high total case rates with few disabling cases.

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[9] The use of confinement to the house as a measure of illness was suggested to us by the late Dr. W. H. Frost.

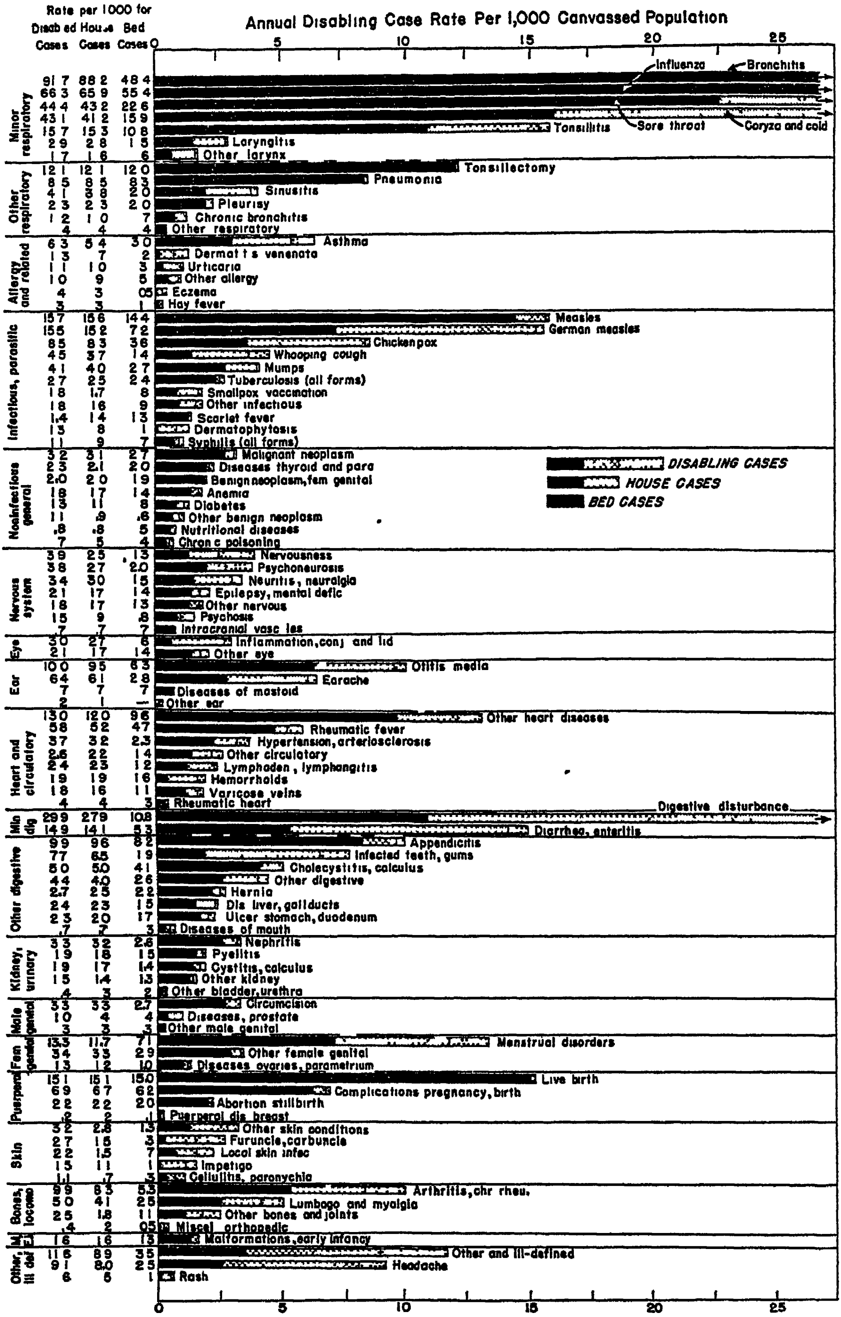


Figure 5. Annual rates per 1,000 canvassed population for cases disabling for 1 day or longer, cases confined to the house for 1 day or longer, and cases confined to bed for 1 day or longer—Baltimore Eastern Health District sample, 1938–43.

Figure 6 represents a classification of diseases according to their importance in terms of annual days of disability per 1,000 persons under observation. According to this classification such diseases as tuberculosis, epilepsy, mental deficiency, psychosis, heart disease, rheumatic fever, arthritis, and other chronic diseases stand out as important causes of illness. Many of the chronic diseases which are relatively infrequent in terms of cases are high in annual days of disability per 1,000 persons, in spite of their infrequent occurrence. Thus, these diseases are particularly important to the community as well as to the individual patient in terms of days of disability. However, the very large number of minor respiratory cases keeps them in the important categories in terms of days of disability, in spite of the short duration per case.

The prevalence rate is a useful measure of the extent of chronic disease in a population at a given time regardless of the date of onset of the cases. Such a rate is expressed as cases which existed in some form on the day of the canvass, per 1,000 individuals under observation. Because of the long durations of chronic diseases, it can be expressed as the number of individuals with chronic disease at any time during a 12-month or shorter period per 1,000 individuals observed at any time during that period, unless the patient had recovered by reason of surgery or other treatment.

Table 7 shows the average prevalence of important chronic diseases during the 5 years, computed as a simple average of prevalence rates for each study year.

At the time that each household first came under observation, the family informant was asked whether anyone in the household had any chronic disease on the interviewer's list or any other chronic disease not on the list. New chronic diseases and medical care and disability from all chronic diseases were recorded at subsequent visits.

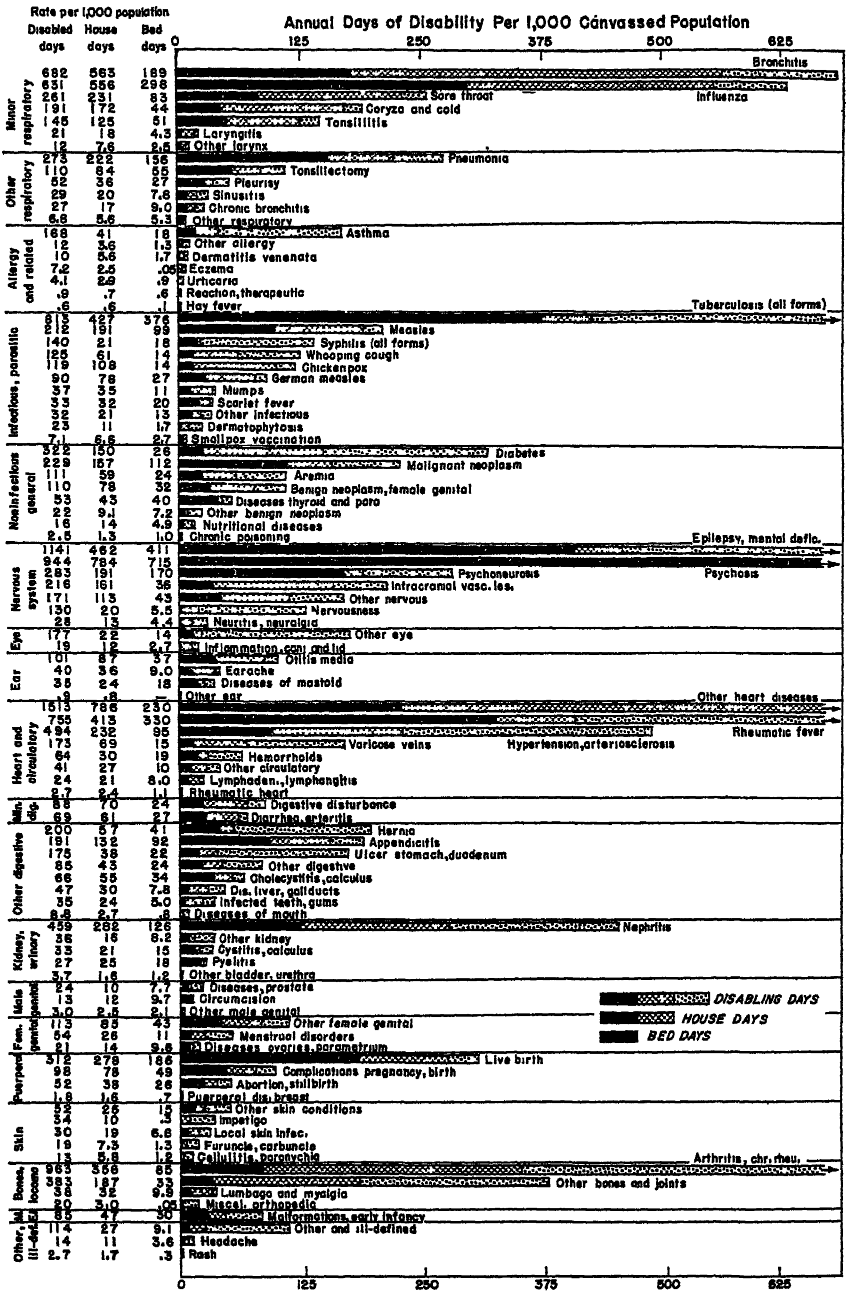
Three types of prevalence rates per 1,000 persons observed are shown in table 7 for each diagnosis, based on the following categories:

(a) Individuals who reported the specified chronic disease and who had one or more days of disability during the whole period of their observation; these individuals may or may not have had medical care.

(b) Individuals who reported the specified chronic disease and who had medical care for it at some time during the whole period of their observation but suffered no days of disability.

(c) Individuals who reported that they had the specified chronic disease but during the whole period of their observation had neither medical care nor a day of disability.

Obviously this method of classifying the chronic cases according to disability and medical care puts many more into classes (a) and (b) than the method used for figure 2 by which the patient is classified



		Rate per 1,000 population		
		Disabled days	House days	Bed days
Minor respiratory	Bronchitis	682	563	189
	Influenza	631	556	298
	Sore throat	261	231	83
	Coryza and cold	191	172	44
	Tonsillitis	145	125	51
	Laryngitis	21	18	4.3
	Other larynx	12	7.6	2.5
Other respiratory	Pneumonia	273	222	156
	Tonsillectomy	110	84	55
	Pleurisy	52	36	27
	Sinusitis	29	20	7.8
	Chronic bronchitis	27	17	9.0
	Other respiratory	6.8	5.6	5.3
Allergy and related	Asthma	168	41	18
	Other allergy	12	3.6	1.3
	Dermatitis venenata	10	5.6	1.7
	Eczema	7.2	2.5	.05
	Urticaria	4.1	2.9	.9
	Reaction, therapeutic	.9	.7	.6
	Hay fever	.6	.6	.1
Infectious, parasitic	Tuberculosis (all forms)	813	427	376
	Measles	212	191	99
	Syphilis (all forms)	140	21	18
	Whooping cough	125	61	14
	Chickenpox	119	108	14
	German measles	90	78	27
	Mumps	37	35	11
	Scarlet fever	33	32	20
	Other infectious	32	21	13
	Dermatophytosis	23	11	1.7
	Smallpox vaccination	7.1	6.6	2.7
Noninfectious general	Diabetes	322	150	26
	Malignant neoplasm	229	157	112
	Anemia	111	59	24
	Benign neoplasm, female genital	110	78	32
	Diseases thyroid and para	53	43	40
	Other benign neoplasm	22	9.1	7.2
	Nutritional diseases	16	14	4.9
	Chronic poisoning	2.5	1.3	1.0
Nervous system	Epilepsy, mental defic.	1141	462	411
	Psychosis	944	784	715
	Psychoneurosis	283	191	170
	Intracranial vasc. les.	216	161	36
	Other nervous	171	113	43
	Nervousness	130	20	5.5
	Neuritis, neuralgia	28	13	4.4
Eye	Other eye	177	22	14
	Inflammation, conj and lid	19	12	2.7
Ear	Otitis media	101	87	37
	Earache	40	36	9.0
	Diseases of mastoid	35	24	18
	Other ear	.9	.8	—
Heart and circulatory	Other heart diseases	1513	786	230
	Rheumatic fever	755	413	330
	Hypertension, arteriosclerosis	494	232	95
	Varicose veins	173	69	15
	Hemorrhoids	64	30	19
	Other circulatory	41	27	10
	Lymphaden., lymphangitis	24	21	8.0
	Rheumatic heart	2.7	2.4	1.1
Min. dig.	Digestive disturbance	88	70	24
	Diarrhea, enteritis	69	61	27
Other digestive	Hernia	200	57	41
	Appendicitis	191	132	92
	Ulcer stomach, duodenum	175	38	22
	Other digestive	85	43	24
	Cholecystitis, calculus	66	55	34
	Dis. liver, gallducts	47	30	7.8
	Infected teeth, gums	35	24	5.0
	Diseases of mouth	8.8	2.7	.8
Kidney, urinary	Nephritis	459	282	126
	Other kidney	36	16	6.2
	Cystitis, calculus	33	21	15
	Pyelitis	27	25	18
	Other bladder, urethra	3.7	1.6	1.2
Male genital	Diseases, prostate	24	10	7.7
	Circumcision	13	12	9.7
	Other male genital	3.0	2.5	2.1
Fem. genital	Other female genital	113	85	43
	Menstrual disorders	54	26	11
	Diseases ovaries, parametrium	21	14	9.6
Puerperal	Live birth	312	278	186
	Complications pregnancy, birth	98	78	49
	Abortion, stillbirth	52	38	26
	Puerperal dis. breast	1.8	1.6	.7
Skin	Other skin conditions	52	26	15
	Impetigo	34	10	.3
	Local skin infec.	30	19	6.6
	Furuncle, carbuncle	19	7.3	1.3
	Cellulitis, paronychia	13	5.8	1.2
Bones, locomo.	Arthritis, chr. rheu.	963	356	85
	Other bones and joints	383	187	33
	Lumbago and myalgia	38	32	9.9
	Miscel. orthopedic	20	3.0	.05
[illegible]	Malformations, early infancy	85	47	30
Other, ill-def.	Other and ill-defined	114	27	9.1
	Headache	14	11	3.6
	Rash	2.7	1.7	.3

Figure 6. Annual days of disability, of confinement to the house, and of confinement to bed for specific diagnoses per 1,000 canvassed population—Baltimore Eastern Health District sample, 1938–43. (Days include those for cases lasting 1 day or longer.)

Table 7. *Average prevalence*[1] *of specific chronic diseases among canvassed white families—Eastern Health District of Baltimore, Md., 1938–1943*

Diagnosis[2]	Average prevalence[1] per 1,000 individuals during the 5 years of the study				Percentage of the total prevalence[1] rate that fell in each of the 3 classes				Total persons with this chronic disease
	All classes of cases	Disabling[3]	Nondisabling[3]		All classes of cases	Disabling[3]	Nondisabling[3]		
			With medical care	Without medical care			With medical care	Without medical care	
Individuals with 1 or more chronic diseases	154.79	90.75	35.64	28.40	100	58.6	23.0	18.4	4,017
Arthritis and chronic rheumatism	35.18	16.57	8.28	10.33	100	47.1	23.5	29.4	886
Heart diseases except rheumatic	26.99	18.12	5.10	3.77	100	67.1	18.9	14.0	716
Rheumatic fever and rheumatic heart	12.81	7.88	1.76	3.17	100	61.6	13.7	24.7	339
Hypertension and cerebral hemorrhage	12.73	5.19	4.71	2.83	100	40.8	37.0	22.2	310
Psychoneurosis	12.30	5.97	4.20	2.13	100	48.6	34.1	17.3	308
Varicose veins	9.10	3.53	1.30	4.27	100	38.8	14.3	46.9	230
Abdominal hernia	7.54	1.92	1.26	4.36	100	25.5	16.7	57.8	208
Diabetes mellitus	6.34	2.72	2.90	.72	100	42.9	45.7	11.4	161
Diseases of gall bladder	6.28	4.61	1.19	.48	100	73.5	18.9	7.6	163
Mental deficiency and epilepsy	6.28	3.97	.51	1.80	100	63.2	8.1	28.7	167
Sinusitis	5.07	1.59	1.89	1.59	100	31.4	37.2	31.4	120
Arteriosclerosis	4.84	2.92	1.33	.59	100	60.3	27.5	12.2	125
Syphilis	4.43	1.59	2.24	.60	100	35.9	50.6	13.5	117
Female genital and breast diseases except tumors	4.32	1.79	2.40	.13	100	41.4	55.6	3.0	112
Psychosis	4.09	3.57	.22	.30	100	87.3	5.4	7.3	108
Diseases of kidney and bladder	4.03	2.07	1.36	.60	100	51.4	33.7	14.9	102
Chronic bronchitis	3.88	1.92	1.14	.82	100	49.5	29.4	21.1	100
Cancer and other tumors	3.65	3.12	.44	.09	100	85.4	12.1	2.5	98
Tuberculosis (all forms)	3.48	2.82	.33	.33	100	81.0	9.5	9.5	100
Ulcer of stomach and duodenum	2.89	1.87	.65	.37	100	64.7	22.5	12.8	73
Hay fever and asthma	2.75	.27	2.11	.37	100	9.8	76.7	13.5	72
Thyroid and parathyroid diseases	2.74	1.25	.61	.88	100	45.6	22.3	32.1	65
All other chronic diseases	22.68	10.80	7.81	4.07	100	47.7	34.4	17.9	592
Total chronic diagnoses[4]	204.40	106.06	52.74	44.60	100	51.9	26.3	21.8	5,272

[1] Prevalence rates were computed for each study year, using all cases that existed at any time during the year and the number of individuals who were observed at any time during the year. Average prevalence is a simple average of these 5 rates.

[2] The prevalence rate for each diagnosis counts all individuals who had that chronic disease regardless of how many other chronic diseases this person had.

[3] Prevalent cases were classified into three groups based on the patient's record during the total observation period: (a) disabled for 1 or more days from this condition; (b) received medical care for this condition but was not disabled; (c) no medical care received for this condition and was not disabled from this condition.

[4] This total is the sum of the prevalence rates, counting all chronic diagnoses for each individual.

as disabled or receiving medical care only in the months in which he was disabled or had care.

Considering the average prevalence rates as shown in table 7, the five most frequent chronic diseases existing in the Baltimore sample population were, in the order of frequency: arthritis, heart disease except rheumatic, rheumatic fever and rheumatic heart, hypertension, and psychoneurosis. Arthritis, the diagnosis with the highest prevalance, is only a minor cause of death, and psychoneurosis, the fifth in prevalence, is of even less frequency as a cause of death. However, the second, third, and fourth in prevalence are major causes of death. Other chronic diseases are listed in the order of average prevalence. The rate of 22.7 per 1,000 for "all other chronic diseases" is made up entirely of diseases for which there were too few cases recorded in this study to use as a basis for reliable rates for the separate diagnoses.

The rates at the top of the table represent individuals who reported one or more chronic diseases. This counts an individual only once

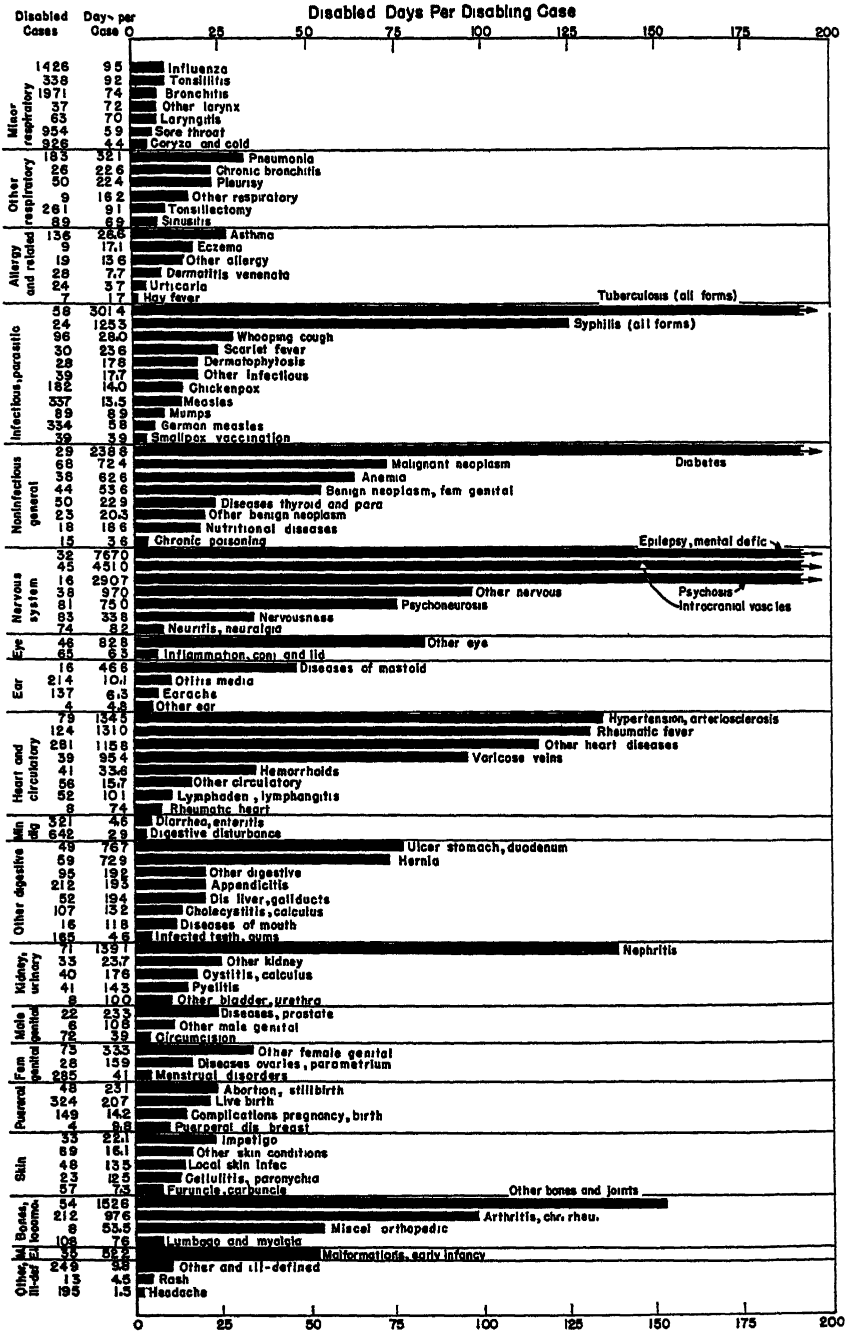


Figure 7. Disabled days per disabling case involving 1 or more days of disability—Baltimore Eastern Health District sample, 1938–43.

even though he had two or more different chronic diseases. The rate of 155 per 1,000 who had a chronic disease is reasonably close to the rate of 177 per 1,000 as found in the National Health Survey (*13*) of 1935–36 which included also impairments such as a stiff joint or a missing finger, arm, or leg.

The last line on table 7 is the sum of the prevalence rates for each diagnosis, counting an individual as many times as the chronic diseases which he reported.

In setting up figure 7 to represent the importance of an illness to the sick individual, it seemed best to use time lost from usual activities (disability) rather than the total time which the individual had had the disease. The total duration frequently means little because so many diseases represented in the nondisabling chronic category are of the nature of physical defects which may interfere relatively little with the work or other activities of the individual; or they may be diseases under good control such as diabetes.

Days of disability per disabling case, in the sense of time lost from usual activities, is a good measure of the importance of the disease to the individual patient. The long disabling durations of chronic diseases are even more important to the patient than they are to the community. Thus in this measure epilepsy, psychosis, tuberculosis, intracranial lesions and residual paralyses, the cardiovascular-renal diseases, rheumatic fever, and diseases of the bones and joints are the most important diseases to the sick individual. Other diseases of shorter duration are important because of high case fatality, but that measure is not included in the present paper.

Summary

This report deals with illness classified into detailed diagnoses in the 5-year study with monthly visits to a sample of the population of the Eastern Health District of Baltimore. It is the first illness paper based on the whole study and including all of the sickness data for the entire sample of the population of the district.

The total recorded illnesses for persons of all ages amounted to an annual rate of 1,379 cases per 1,000 canvassed population. Nondisabling illness accounted for 729 cases per 1,000, and cases disabling for 1 day or longer amounted to 650 per 1,000 canvassed population. The annual days disabled within the period of observation was 15.8 per person observed. This amounted to 24.4 days of disability per disabling case.

These various types of rates are presented for detailed diagnoses in figures 4, 5, 6, and 7, and in table 6. The specific diagnoses are shown as an array within each broad disease group. The specific diagnoses are too numerous for discussion here.

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Incidence of Disease

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

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UNITED STATES

Reports From States for Week Ended September 9, 1950

For the current week, new cases of acute poliomyelitis reported in the Nation numbered 1,745, a 7.3 percent increase over the 1,626 cases reported last week. This is the sixteenth consecutive week which shows an increase over the preceding week. For the corresponding week in 1949, 2,698 cases were reported.

The cumulative total (14,099) for the current "disease" year was below the corresponding total (25,525) for last year, the highest on record. The "disease" year for acute poliomyelitis begins with the twelfth week of the calendar year. The cumulative total for the calendar year was 15,233, compared with the total of 26,440 for the corresponding period last year.

For the current week, 2 of the 9 geographic divisions decreased from the preceding week in reported cases of acute poliomyelitis. These decreases ranged from 52 (408 to 356) cases reported in the East

Comparative Data for Cases of Specified Reportable Diseases: United States

[Numbers after diseases are International List numbers, 1948 revision]

Disease	Total for week ended—		5-year median, 1945–49	Seasonal low week	Cumulative total since seasonal low week—		5-year median, 1944–45 through 1948–49	Cumulative total for calendar year—		5-year median, 1945–49
	Sept. 9, 1950	Sept. 10, 1949			1949–50	1948–49		1950	1949	
Anthrax (062)	1	--------	(1)	(1)	(1)	(1)	(1)	30	38	(1)
Diphtheria (055)	112	146	169	27th	657	964	1,230	3,785	4,732	7,527
Acute infectious encephalitis (082)	37	34	27	(1)	(1)	(1)	(1)	631	479	390
Influenza (480–483)	833	551	706	30th	4,483	3,338	3,338	250,742	79,205	143,432
Measles (085)	506	499	543	35th	506	499	543	288,677	589,017	552,229
Meningococcal meningitis (057.0)	36	49	48	37th	3,666	3,314	3,574	2,753	2,470	2,602
Pneumonia (490–493)	700	741	--------	(1)	(1)	(1)	(1)	62,831	58,039	--------
Acute poliomyelitis (080)	1,745	2,698	1,526	11th	[2]14,099	25,525	13,693	[2]15,233	26,440	14,160
Rocky Mountain spotted fever (104)	11	17	17	(1)	(1)	(1)	(1)	394	500	467
Scarlet fever (050)	291	264	400	32d	1,057	922	1,549	41,227	58,588	63,652
Smallpox (084)	--------	1	1	35th	--------	1	1	26	42	148
Tularemia (059)	13	27	19	(1)	(1)	(1)	(1)	[2]691	869	718
Typhoid and paratyphoid fever (040, 041)[3]	84	117	111	11th	1,905	2,274	2,274	2,415	2,762	2,762
Whooping cough (056)	1,890	1,440	1,798	39th	113,432	52,373	96,118	91,896	42,340	70,100

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[1] Not computed.

[2] Deductions: Poliomyelitis—Georgia, week ended August 19, 1 case; Michigan, week ended September 2, 1 case. Tularemia—Arkansas, week ended Sept. 2, 1 case.

North Central States to 16 (186 to 170) in the West North Central States. The 7 divisions increasing over the preceding week ranged from 49 (72 to 121) cases in the East South Central States to 6 (34 to 40) in the Mountain States.

The States reporting the largest numbers of cases of poliomyelitis for the week were: New York (253), Illinois (110), Pennsylvania (95), Texas (91), Ohio (83), and Michigan (81).

The total number of cases of infectious encephalitis reported for the week was 37 compared with 34 reported for the corresponding period last year. For the calendar year, a total of 631 cases was reported, the highest total in the past 5 years.

For the current week, 1,890 cases of whooping cough were reported compared with 1,440 reported for the corresponding week last year. The cumulative total number of cases of whooping cough reported for the calendar year to date was 91,896 compared with 42,340 for the corresponding period last year. States reporting the largest numbers of cases for the current week were: Michigan (175), Texas (171), New York (132), Pennsylvania (114), Wisconsin (111), and California (102).

For the Nation, reported cases of diphtheria increased slightly, from 82 last week to 112 cases for the current week. The States reporting the largest numbers of cases were: North Carolina (28), Kentucky (11), Virginia (11), and Texas (10).

No smallpox was reported in the United States. One case of anthrax was reported in Pennsylvania.

Of 41 States and the District of Columbia reporting on rabies in animals, 20 States and the District of Columbia reported no cases. The remaining 21 States reported 119 cases. States reporting the largest numbers were: Texas (24), New York (20), and Iowa (17).

Deaths During Week Ended September 9, 1950

	Week ended Sept. 9, 1950	*Corresponding week, 1949*
Data for 94 large cities of the United States:		
Total deaths	7, 960	7, 831
Median for 3 prior years	7, 871	----------
Total deaths, first 36 weeks of year	331, 675	332, 175
Deaths under 1 year of age	581	552
Median for 3 prior years	614	----------
Deaths under 1 year of age, first 36 weeks of year	22, 317	23, 508
Data from industrial insurance companies:		
Policies in force	69, 608, 690	70, 176, 809
Number of death claims	9, 447	8, 887
Death claims per 1,000 policies in force, annual rate	7. 1	6. 6
Death claims per 1,000 policies, first 36 weeks of year, annual rate	9. 4	9. 3

Reported Cases of Selected Communicable Diseases: United States, Week Ended Sept. 9, 1950

[Numbers under diseases are International List numbers, 1948 revision]

Area	Diphtheria (055)	Encephalitis, infectious (082)	Influenza (480–483)	Measles (085)	Meningitis, meningococcal (057.0)	Pneumonia (490–493)	Poliomyelitis (080)
United States	**112**	**37**	**833**	**506**	**36**	**700**	**1,745**
New England	**3**	-	**1**	**48**	**1**	**17**	**87**
Maine	-	-	-	1	-	5	9
New Hampshire	-	-	-	2	-	-	2
Vermont	-	-	-	5	-	-	2
Massachusetts	3	-	-	29	-	-	33
Rhode Island	-	-	1	1	-	-	8
Connecticut	-	-	-	10	1	12	33
Middle Atlantic	**7**	**6**	**1**	**101**	**6**	**168**	**397**
New York	6	[1]5	-	41	3	117	253
New Jersey	-	-	1	33	1	29	49
Pennsylvania	1	1	-	27	2	22	95
East North Central	**3**	**3**	**11**	**120**	**6**	**72**	**356**
Ohio	2	-	-	19	1	-	83
Indiana	-	2	-	4	-	6	26
Illinois	1	-	-	28	3	48	110
Michigan	-	-	1	14	2	14	81
Wisconsin	-	1	10	55	-	4	56
West North Central	**4**	**6**	**13**	**24**	**4**	**101**	**170**
Minnesota	1	-	2	9	-	7	41
Iowa	-	-	-	1	-	-	47
Missouri	2	1	-	2	2	11	13
North Dakota	-	2	2	3	1	73	-
South Dakota	-	2	-	6	1	-	10
Nebraska	-	-	6	-	-	1	24
Kansas	1	1	3	3	-	9	35
South Atlantic	**54**	**1**	**209**	**23**	**4**	**72**	**257**
Delaware	-	-	-	3	-	-	2
Maryland	-	-	1	1	-	13	43
District of Columbia	-	-	1	-	-	10	10
Virginia	11	-	172	9	-	20	71
West Virginia	3	-	10	5	1	5	24
North Carolina	28	-	-	1	1	-	46
South Carolina	5	1	11	-	1	7	18
Georgia	6	-	14	1	-	13	24
Florida	1	-	-	3	1	4	19
East South Central	**18**	**1**	**16**	**17**	**5**	**40**	**121**
Kentucky	11	-	-	9	1	17	51
Tennessee	-	1	4	5	3	-	38
Alabama	5	-	12	3	-	14	13
Mississippi	2	-	-	-	1	9	19
West South Central	**19**	-	**526**	**54**	**7**	**165**	**161**
Arkansas	-	-	27	2	1	16	12
Louisiana	6	-	-	-	1	5	17
Oklahoma	3	-	35	5	-	24	41
Texas	10	-	464	47	5	120	91
Mountain	-	-	**45**	**50**	-	**18**	**40**
Montana	-	-	9	1	-	1	1
Idaho	-	-	1	2	-	-	7
Wyoming	-	-	-	2	-	-	1
Colorado	-	-	23	41	-	7	15
New Mexico	-	-	-	-	-	5	10
Arizona	-	-	12	2	-	5	4
Utah	-	-	-	2	-	-	2
Nevada	-	-	-	-	-	-	-
Pacific	**4**	**20**	**11**	**69**	**3**	**47**	**156**
Washington	-	-	-	5	-	1	59
Oregon	1	-	1	13	-	4	25
California	3	20	10	51	3	42	72
Alaska	-	-	-	-	-	1	-
Hawaii	1	-	41	1	-	-	1

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[1] New York City only.

Reported Cases of Selected Communicable Diseases: United States, Week Ended Sept. 9, 1950—Continued

[Numbers under diseases are International List numbers, 1948 revision]

Area	Rocky Mountain spotted fever (104)	Scarlet fever (050)	Smallpox (084)	Tularemia (059)	Typhoid and paratyphoid fever [1] (040, 041)	Whooping cough (056)	Rabies in animals
United States	**11**	**291**		**13**	**84**	**1,890**	**119**
New England		**23**		**1**	**2**	**221**	
Maine						52	
New Hampshire						18	
Vermont		1			1	25	
Massachusetts		16		1		84	
Rhode Island						17	
Connecticut		6			1	25	
Middle Atlantic	**2**	**39**			**11**	**334**	**26**
New York		[2] 20			4	132	20
New Jersey	1	6				88	
Pennsylvania	1	13			7	114	6
East North Central	**1**	**60**		**3**	**5**	**442**	**13**
Ohio		35			3	62	3
Indiana		6			1	37	9
Illinois	1	6		3		57	
Michigan		7			1	175	1
Wisconsin		6				111	
West North Central		**18**			**3**	**142**	**18**
Minnesota		3				34	
Iowa		1			1	30	17
Missouri		4			2	12	
North Dakota		1				10	
South Dakota						6	
Nebraska		7				3	
Kansas		2				41	1
South Atlantic	**2**	**42**		**4**	**12**	**209**	**18**
Delaware		1				4	
Maryland		1		1	1	24	
District of Columbia		2				4	
Virginia	2	7		3	1	48	1
West Virginia		2			2	46	1
North Carolina		20			1	62	
South Carolina		3				4	9
Georgia		4			5	15	5
Florida		2			2	2	2
East South Central	**3**	**38**		**1**	**2**	**73**	**15**
Kentucky		4				19	5
Tennessee	1	21		1	1	27	3
Alabama	1	6				27	6
Mississippi	1	7			1		1
West South Central	**2**	**26**		**2**	**36**	**201**	**27**
Arkansas	1	2			2	9	1
Louisiana		3			7	3	
Oklahoma	1	12		2	11	18	2
Texas		9			16	171	24
Mountain	**1**	**11**		**2**	**4**	**106**	**1**
Montana	1	2		1		16	
Idaho		1				7	
Wyoming						1	
Colorado		4			2	27	1
New Mexico		1			2	34	
Arizona		2				17	
Utah		1		1		4	
Nevada							
Pacific		**34**			**9**	**162**	**1**
Washington		2				41	
Oregon						19	
California		32			9	102	1
Alaska							
Hawaii							

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[1] Including cases reported as salmonellosis.

[2] Including cases reported as streptococcal sore throat.

FOREIGN REPORTS

CANADA

Reported Cases of Certain Diseases—Week Ended Aug. 19, 1950

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Brucellosis					1	1		1	1		4
Chickenpox			4		15	67	23	4	25	16	154
Diphtheria				1		1	6				8
Dysentery, bacillary					2	3	3			15	23
German measles			1		2	37		1	11	8	60
Influenza						7					7
Measles	1				37	119	11	1	15	19	203
Meningitis, meningococcal					1	2					3
Mumps	1		12		29	64	7	14	36	19	182
Poliomyelitis	2		2	1	12	18		11	19	4	69
Scarlet fever				2	8	11	2	1	8	8	40
Tuberculosis (all forms)	6		3	9	44	44	30	11	19	22	188
Typhoid and paratyphoid fever	1				8	2		1	1	3	16
Venereal diseases:											
Gonorrhea	3		4	5	87	72	43	29	54	79	376
Syphilis	4		2	3	69	20	6	16	6	20	146
Whooping cough			9	1	54	55	15		2	33	169

FINLAND

Reported Cases of Certain Diseases—July 1950

Disease	Cases	Disease	Cases
Diphtheria	70	Scarlet fever	468
Dysentery	2	Typhoid fever	15
Malaria	1	Venereal diseases:	
Meningitis, meningococcal	4	Gonorrhea	607
Paratyphoid fever	82	Syphilis	31
Poliomyelitis	23	Other forms	1

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

The following tables are not complete or final for the list of countries included or for the figures given. Since many of the figures are from weekly reports, the accumulated totals are for approximate dates.

CHOLERA

(Cases)

Place	January–June 1950	July 1950	August 1950—week ended—			
			5	12	19	26
ASIA						
Burma	64	248	44	28	11	
Akyab	2					
Bassein	3					
Maubin	3					
Pegu	1					
Rangoon	1					
Toungoo		1				

CHOLERA—Continued

Place	January–June 1950	July 1950	August 1950—week ended—			
			5	12	19	26
ASIA—continued						
India	68, 327	13, 506	[1] 3, 920	[1] 4, 338	[1] 1, 564	
Ahmedabad	7			1		
Allahabad	3					
Bombay	[2] 2	307	58	24	21	7
Calcutta	[2] 7, 686	869	115	84	66	62
Cawnpore	1					
Cocanada	2					
Cuddalore	31					
Lucknow	10	2				
Madras	11				[3] 5	6
Masulipatam	46	1				
Nagpur		4	4	2	4	17
Negapatam	67			[3] 4	7	10
New Delhi	12	42	13	9	19	15
Port Blair (Andaman Islands)	[3] 2					
Tellicherry	27					
Tiruchirappalli		1				
Trichinopoly		1				
Tuticorin	25					
India (French)	588	231		71	97	
Karikal	381				1	
Pondicherry	207	231		71	96	
Indochina (French)	13	3	2			1
Cambodia	5					
Viet Nam	8	3	2			1
Giadinh	3					
Rachgia	1					
Pakistan	20, 372	1, 572	[1] 307	[1] 41		
Chittagong	158	27	1			
Dacca	186	1				

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[1] Preliminary figures. [2] Includes imported cases. [3] Imported.

PLAGUE

(Cases)

AFRICA						
Belgian Congo	[1]10	7	1	6	3	
Costermansville Province	[1]4	1		[2] 5	[2]3	
Stanleyville Province	[1]6	[3]6	1	1		
Madagascar	45	3		[4]1	[5]2	
Rhodesia, Northern	2					
Union of South Africa	9	1				
Orange Free State	7					
Transvaal Province		1				
Johannesburg		1				
ASIA						
Burma	213	10	1	5	2	
Bassein	1					
Bhamo	[6]4					
Henzada	14					
Kyaiklat	34					
Minhla		1				
Moulmein	[6]2	1				
Myaungmya	5					
Myingyan	2					
Pegu	2	1				
Pyapon	1	2				
Rangoon	[6]6	2				
Yenangyaung	58					
China:						
Chekiang Province	35					
Wenchow	[7]4					
Fukien Province	696	10				
Amoy		10				
Kwangsi Province	[7]63					
Kwangtung Province	145					
India	[1]36, 529	85	51	83		
Allahabad	[5]19					
Bombay	[6]5					
Calcutta	[6]3					
Cawnpore	18					
Lucknow	[6]9					

PLAGUE—Continued

Place	January-June 1950	July 1950	August 1950—week ended— 5	12	19	26
ASIA—continued						
Indochina:						
Annam	70	8	1	3		1
Phanthiet	66	8	1	3		1
Cambodia	[9]46					
Pnompenh	3					
Cochinchina	7	5	1			
Saigon		1				
Laos	2					
Indonesia:						
Java	339	27	5	3	3	
Bandoeng	3					
Djakarta		[6]2			1	
Jogjakarta	177	25	5	3	2	
Pakistan	1					
Karachi	[8]1					
Thailand	56					
SOUTH AMERICA						
Ecuador	14					
Chimborazo Province	4					
El Oro Province	4					
Loja Province	6					
Peru	16	2				
Ancash Department	3					
Lambayeque Department	1	1				
Libertad Department		1				
Lima Department	5					
Piura Department	7					
Venezuela	5					
Miranda State	5					

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[1] Corrected figure. [2] Pneumonic plague. [3] Includes 1 case of pneumonic plague. [4] Aug. 1-10, 1950. [5] Aug. 11-20, 1950. [6] Includes imported cases. [7] Deaths. [8] Imported. [9] Includes suspected cases.

SMALLPOX

(Cases; P=present)

Place	January-June 1950	July 1950	August 1950—week ended— 5	12	19	26
AFRICA						
Algeria	86	4				
Angola	144					
Bechuanaland	38					
Belgian Congo	1,536	503	115	184		
British East Africa:						
Kenya	10					
Nyasaland	240	6		2		
Tanganyika	1,451	698				
Uganda	2					
Cameron (British)	331	12				
Cameron (French)	92	1				
Dahomey	207	11		[1]29	[2]10	
Egypt	[2]4					
Eritrea	1					
Ethiopia	23					
French Equatorial Africa	431	15				
French Guinea	12					
French West Africa: Haute Volta	201	4				
Gambia	5					
Gold Coast	99	82			20	38
Ivory Coast	505	48		[1]44	[2]1	
Libya	2					
Mauritania	1					
Morocco (French)	7	2		[1]1		
Mozambique	128	52				
Nigeria	12,876	633	[4]2	[4]4	[4]5	
Niger Territory	1,005	54		[1]4	[2]5	
Rhodesia:						
Northern	4					
Southern	404					
Senegal	2					
Sierra Leone	30					
Sudan (Anglo-Egyptian)	69	2		1		
Sudan (French)	103	5		[1]8	[2]38	
Togo (French)	48				[2]24	
Tunisia	1					
Union of South Africa	614	P		[1]18		

See footnote at end of table.

SMALLPOX—Continued

Place	January–June 1950	July 1950	August 1950—week ended—			
			5	12	19	26
ASIA						
Afghanistan	276	15				
Arabia	[3]331			2		
Bahrein Islands: Bahrein	34		2			
Burma	4,956	31	7	3	3	
Ceylon: Colombo			[5]1			
China	699	[6]47				
India	100,669	11,262	[7]1,644	[7]1,533	[7]387	
India (French)	73	99		8	20	
India (Portuguese)	50	11				
Indochina	365	19	4	4	2	8
Indonesia:						
Borneo	[3]275	205	44	11		
Java	2,465	1,153	316	221	226	19
Sumatra	266	76			2	
Iran	183	22	19	3		
Iraq	[3]129	10		1		[5]4
Israel	15					
Japan	3	1				
Korea (Republic of)	1,331					
Lebanon	2					
Netherlands New Guiena	3					
Pakistan	13,000	1,197	245			
Palestine	90	1				
Straits Settlements:						
Singapore				[3]2		
Syria	15					
Thailand	460					
Transjordan	30	5				
Turkey (See Turkey in Europe.)						
United Nations Relief and Works Agency for Palestine Refugees	3	9	2	1		
EUROPE						
Great Britain:						
England: Liverpool	[5]1					
Scotland: Glasgow	21					
Greece	[8]15					
Athens	1					
Piraeus	1					
Xylokastron	1					
Portugal	[9]1					
Spain: Canary Islands		1				
Turkey	8					
NORTH AMERICA						
Guatemala	3					
Mexico	428	6				
SOUTH AMERICA						
Argentina	517					
Brazil	34	14	4	2	3	
Chile	3,617	87	4	7		
Colombia	558	9	1			
Ecuador	104	5				
Paraguay	1					
Peru	1,211					
Venezuela	706					
OCEANIA						
Australia: Freemantle	[5]1					

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[1] Aug. 1–10, 1950. [2] Aug. 11–20, 1950. [3] Includes imported cases. [4] In Lagos only. [5] Imported.
[6] In Shanghai only. [7] Preliminary figures. [8] Includes suspected cases. May 1–31, 1950.

TYPHUS FEVER*

(Cases; P=present)

AFRICA						
Algeria	88	12				
Basutoland	22					
Belgian Congo	[1]67	[1]8				
British East Africa: Kenya	17					
Egypt	77	5	2			

TYPHUS FEVER—Continued

Place	January–June 1950	July 1950	August 1950—week ended—			
			5	12	19	26
AFRICA—continued						
Eritrea	14	8	1			
Ethiopia	513					
French Equatorial Africa	5					
Gold Coast	6					
Libya:						
Cyrenaica	27					
Tripolitania	66	2				
Madagascar	[1] 2					
Morocco (French)	5	1			1	
Morocco (International Zone)	1					
Morocco (Spanish Zone)	3					
Mozambique	3					
Nigeria	1					
Rhodesia, Southern	6					
Sierra Leone	[2] 5					
Sudan (Anglo-Egyptian)	4					
Tunisia	50	3				
Union of South Africa	[1] 76	P	P			
ASIA						
Afghanistan	1,282	10				
Burma	[2] 8	[2] 7				
China	[2] 16	[2] 4				
India	259	8	1			
India (Portuguese)	11	7				
Indochina	30	2		1		1
Indonesia:						
Java	6					
Sumatra	1					
Iran	152	16	2	1	2	
Iraq	111	11			2	
Japan	888	32	2			
Korea (Republic of)	[2] 1,161					
Lebanon	1					
Netherlands New Guinea	1	1				
Pakistan	88	4	1	1	1	
Palestine	2					
Straits Settlements: Singapore	[1] 5					
Syria	[1] 37					
Transjordan	15	2	2	1		
Turkey (see Turkey in Europe).						
United Nations Relief and Works Agency for Palestine Refugees	2	2				
EUROPE						
France	1					
Germany (British Zone)	2					
Germany (French Zone)	2					
Germany (United States Zone)	1	1				
Great Britain:						
England: Liverpool	[2,4] 1					
Island of Malta	[2] 5	[2] 4	[2] 2	[2] 1	[2] 4	
Greece	[1] 25	2				
Hungary	4					
Italy	[5] 37					
Sicily	[5] 29					
Poland	37					
Portugal	2					
Spain	25	17				
Turkey	125	7	4	3	2	3
Yugoslavia	236	11				
NORTH AMERICA						
Costa Rica [2]	4		1	1		
Guatemala	20					
Jamaica [2]	21	8	1		1	1
Mexico [1]	276	29	2	3		
Panama Canal Zone	[2] 2					
Puerto Rico [2]	13	1		1		
SOUTH AMERICA						
Argentina	2					
Chile	76	19	13		4	
Colombia	461					
Curacao	1					
Ecuador	141	2				
Peru	547					
Venezuela	72					

TYPHUS FEVER—Continued

Place	January-June 1950	July 1950	August 1950—week ended—			
			5	12	19	26
OCEANIA						
Australia [2]	80	12	7	---	---	---
Hawaii Territory	[1] 7	1	---	---	---	---

*Reports from some areas are probably murine type, while others include both murine and louse-borne types.

[1] Includes murine type. [2] Murine type. [3] Reported as deaths. [4] Imported. [5] Corrected figure.

YELLOW FEVER

(C—cases; D—deaths)

AFRICA							
French Equatorial Africa	C	1	---	---	---	---	---
Port Gentil	C	[1] 1	---	---	---	---	---
Gold Coast	C	10	2	---	1	---	---
Accra	D	---	[1] 1	---	[1] 1	---	---
Ankobra Ferry	D	1	---	---	---	---	---
Bogoso	C	---	[1] 1	---	---	---	---
Kade	C	1	---	---	---	---	---
Oda Area:							
Akwatia	C	[2] 7	---	---	---	---	---
Atiankama	C	1	---	---	---	---	---
Nigeria	D	---	---	1	1	---	---
Calabar	D	---	---	[3] 1	---	---	---
Ibadan	D	---	---	---	[1] 1	---	---
Sierra Leone	C	2	---	---	---	---	---
Koinadugu District	C	[4] [5] 2	---	---	---	---	---
NORTH AMERICA							
Panama:							
Colon	D	1	---	---	---	---	---
SOUTH AMERICA							
Bolivia:							
Chuquisaca Department	C	[6] 850	---	---	---	---	---
La Paz Department	C	[7] 17	---	---	---	---	---
Brazil:							
Maranhao State	D	1	---	---	---	---	---
Colinas	D	1	---	---	---	---	---
Colombia:							
Magdalena Department	D	1	---	---	---	---	---
Los Angeles, Rio de Oro	D	1	---	---	---	---	---
Putumayo Commissary	D	3	---	---	---	---	---
Mocoa Locality	D	3	---	---	---	---	---
Peru:							
Cuzco Department	D	2	---	---	---	---	---
Quincemil	D	2	---	---	---	---	---
Huanuco Department	D	1	---	---	---	---	---
Tingo Maria	D	1	---	---	---	---	---
Junin Department	D	1	---	---	---	---	---
San Ramon	D	1	---	---	---	---	---
San Martin Department	D	2	---	---	---	---	---
Juanjui	D	1	---	---	---	---	---
Lamas	D	1	---	---	---	---	---

[1] Suspected. [2] Includes 4 suspected cases. [3] Imported. [4] Includes one suspected case. [5] One fatal suspected case reported in Koinadugu District, Sierra Leone, June 24–25, 1950 (see PUBLIC HEALTH REPORTS for Aug. 25, 1950, p. 1110), was not confirmed. [6] Estimated number of cases reported (230 deaths) in an outbreak in Azero Province Jan. 1–Mar. 14, 1950. [7] Outbreak in North and South Yungas Provinces (8 deaths).

Plague Infection in Rawlins County, Kans.

Under date of September 8, 1950, plague infection was reported proved in a specimen of 128 fleas, *Opisocrotis hirsutus*, taken from 7 prairie dogs, *Cynomys ludovicianus*, shot August 24, 1950, 10 miles west of Atwood on U. S. Highway 36, then 14 miles south on county road (Field's Ranch) in Rawlins County.

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

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Public Health Reports

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FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
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Division of Public Health Methods
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Public Health Reports

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—Editorial—

Survey Pattern

An intensive community-wide chest X-ray program is a tremendous undertaking. Community resources are inventoried, evaluated, and activated toward the common goal of the program. Large numbers of people and organizations are involved, both before and behind the scenes. And, finally, the momentum of the survey is directed toward the entire problem of tuberculosis and persists after the screening operations.

The community-wide survey represents a unique opportunity for a community to rethink its tuberculosis control program. It can be the starting point for an all-out effort to eliminate tuberculosis as a public health problem. It finds cases of tuberculosis which too often go unrecognized until death certificates bear eloquent testimony to our omissions in tuberculosis control. In our big cities, the statistician writes "Never reported as a living case" on the records of 30 percent of the tuberculosis deaths.

With the impetus of the community-wide survey, many agencies which always have been potentially a part of the tuberculosis control program now actually become a part of it in fact. Community leaders learn about tuberculosis and can give informed support to future tuberculosis control activities.

Since 1947, the Public Health Service has participated in the conduct of 12 community-wide chest X-ray surveys, and has assisted State and local health departments in the X-ray screening of more than 4 million persons. There was some question in people's minds as to whether large cities could do what has been possible in smaller communities, and some doubt as to whether the results would be as good. Twelve large cities have shown that an effective community-wide survey can be accomplished in a large metropolitan area so that it produces results that are concrete and of lasting value. As the survey teams have rolled across country, from Boston to Los Angeles, amassing experi-

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This is the fifty-sixth of a series of special issues of Puplic Health Reports devoted exclusively to tuberculosis control The special issues began March 1, 1946, and appear the first week of each month. The articles are reprinted as extracts. Effective with the July 5, 1946, issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 10 cents a single copy. Subscriptions are obtainable at $1.00 per year, $1.25 foreign.

ence, certain distinct patterns of survey operation have evolved which, when taken together, can be said to be applicable to such case-finding programs wherever they are undertaken.

What these patterns are and how they came into being is of interest to all public health workers. For this reason, the Tuberculosis Control Issue of PUBLIC HEALTH REPORTS this month begins a series of articles depicting the planning, operation, and follow-up of the type of community-wide chest X-ray survey in which the Public Health Service has participated. The accompanying article, "Community-Wide Chest X-ray Survey—Introduction," will be followed by presentations of the medical, nursing, medical social work, forms and records, health education, administration, and technical activities typically encountered in such programs.

ROBT. J. ANDERSON, *Medical Director,*
Chief, Division of Tuberculosis.

Community-Wide Chest X-ray Survey

I. Introduction

OKAY, LET'S X-RAY . . . THE CRYSTAL BALL CAN'T TELL YOU, BUT THE X-RAY CAN . . . THE MOST IMPORTANT PICTURE YOU CAN TAKE . . .

These slogans have urged people in cities across the country from Boston to Cleveland to St. Paul to Denver to Tacoma to stop a minute and get a chest X-ray to check for tuberculosis. And the people have responded enthusiastically; as many as the 93 percent of the adults in Salt Lake City who had chest X-rays during their 4-week survey.

How does this come about? What combination of men and machines contrives to stop the lawyer, the milkman, the college sophomore and get him to have his chest X-rayed? What was required to have the radio announce every half-hour ". . . Come on down—X-ray's in town . . ."?

What goes into the planning, preparation and conduct of an undertaking in which

—every adult in a city of over 100,000 can have a chest X-ray without charge at X-ray units placed in convenient business and residential locations for several months;

—all X-ray pictures will be read by physicians in less than 15 days, and reports will be sent promptly saying either there are no abnormal shadows on the X-ray or that a second, larger film is recommended;

—the second films are also made without charge at a retake center and reports are sent to physicians or clinics for diagnosis and treatment;

—the patient whose second X-ray indicates that further study is necessary has further X-rays, laboratory tests, physical examinations;

—the patient continues under the care of a physician until a diagnosis is established, and gets help in his personal adjustment to his situation from public health nurses and medical social workers;

—the patient who is diagnosed as having tuberculosis receives medical care and other services which he needs, either in a sanatorium or at home?

The answer to this lengthy question would describe the mobilization of the city's medical, public health, and social forces for a concentrated attack on tuberculosis. But first it would have to describe

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From the Office of the Chief, Division of Tuberculosis, Public Health Service.

the thinking which made such mobilization possible. The success of the survey depends upon a breadth of understanding and exchange of ideas which the survey itself engenders. Around the conference table of survey planning sit the private physician, the health officer, the sanatorium director, the public health nurse, the medical social worker, the tuberculosis association secretary—and each in contributing his own point of view broadens that of the others. They work out ways of exchanging information about the current practices of various community health and social agencies, so that each will know the functions and services of the others—so that the department of welfare will know what the Veterans' Administration does, for instance, and the nursing division of the county health department will know what services are offered by the family society. In one city where there was no council of social agencies, the planning group decided that a brochure should be developed to describe briefly the programs of the various agencies. It was distributed widely to health and social agencies and physicians.

The planners take up problems such as how to provide care at home which will be necessary for some patients. What medical, public health nursing, and home-maker services can the city provide for this group? What steps will the social agencies have to take to help families or patients? What support can be given to the young mother of three children who is told to rest every afternoon until a diagnosis is established in 6 weeks?

The community-wide survey is not merely a multiplication in numbers of workers, people, and films involved in the usual case-finding program; it is not a small survey extended by 12 or 16 X-ray units. The successful community-wide survey demands a breadth of medical and public health vision attained only by the combined force of physicians from many specialties, nurses from every field of nursing, social workers from all community agencies, and plain citizens from all significant community interests. For example, the medical participation in smaller surveys is usually limited to the several physicians who are immediately responsible. In the community-wide program many physicians from the entire city are deeply involved. The internist, the roentgenologist, the surgeon—each contributes his thoughtful, independent approach to the city's tuberculosis problem, and this cooperation makes it possible for the survey to have an impact on the disease. They spend hours planning not only details of procedure but strategy which will exploit the full potential of the survey to the the community, to the patients, to the health department, and to themselves with a consequent spread of ideas and deepening of understanding.

The Division of Tuberculosis of the Public Health Service has assisted many cities in planning and developing community-wide surveys, and the procedures have not been exactly the same in every city. By now, as a result of accumulated experience in all surveys, a pattern has developed and by the time a community-wide survey opens, planning has resulted in typical activities like the following:

1. The health department has obtained sufficient increase in its budget to provide additional services and facilities made necessary by the survey. Its program has been rearranged so that six public health nurses can be assigned to the retake center. Its chest clinic is prepared to take care of more patients and to offer social services to those who need them. An extra technician is in the health department laboratory, and an extra clerk is working on the tuberculosis case register. The director of the sanatorium has managed to open 60 beds for new patients.
2. The Public Health Service has agreed to lend the city X-ray units and technicians to man them, experienced physicians to read films, and consultants in medicine, medical social work, public health nursing, record keeping, health education, and administration.
3. The medical society of the city and the health department have arranged for a panel of local doctors to review retake films; have planned for free medical supervision for those who are found to need it and are unable to pay; and have provided for distribution of full information on survey procedures for tuberculosis control to all doctors in the community.
4. The various voluntary organizations of the community have set up machinery to help put the survey over. The tuberculosis association has lent full-time staff to work on publicity, health education, and community organization. It has also agreed to contribute part of the cost of the survey (the rest to come from the local governmental budget and the Public Health Service as well as from contributions in kind from other organizations and businessmen in the community).
5. The member agencies of the council of social agencies are prepared to offer help to patients or their families if they need it.
6. A thousand volunteers from business, industry, schools, civic and professional groups, and homes have gone to training classes to learn about tuberculosis and its control.

The decision that a survey should be done in a given community is not one that is made quickly by an official sitting at a big desk. Sometimes the beginning is in the health department, sometimes in the medical society, sometimes in the tuberculosis association. Those three organizations, however, are the essential nucleus from which the survey evolves. While one or the other may actually begin the thinking toward the survey, all three must take part in its inception.

Such efforts are not spontaneous. The health department, the medical society, and the tuberculosis association do not wake up one morning suddenly seeing everything clearly and rush together to plan a city-county chest X-ray survey. One of the three, probably one man in one of the three, stirs the idea around for a while before he even comes out with it. Then he starts talking about it with his own immediate colleagues, and after a while no one remembers who started the talk.

Often, the early thinking about a survey begins in the tuberculosis association. On the alert for new ways of combating the disease, people in tuberculosis associations are frequently the first people in a community to feel the need for a survey and take a first measure of its possible effectiveness. In many instances they have been maintaining mobile X-ray units for use in industry, and they are therefore aware of the advantages of taking X-rays of the whole community.

The health department also has good reason to see the value in a project to X-ray the entire population, since it is the official agency immediately responsible for control of communicable diseases. In many places, the health department has chest X-ray programs, but almost never in large cities is its equipment and staff sufficient to make possible the X-raying of the whole population in a short time, 5 or 6 weeks for a population of 100,000.

Private physicians are in close touch with tuberculosis as a medical problem and with the personal tragedies that it can cause. Perhaps the impact of such a tragedy motivates a doctor to bring before the medical society the question of what can be done to reduce the number and assuage the severity of the misfortunes caused by tuberculosis.

Wherever the idea is born, its growth will depend upon many agencies and their ability and willingness to work together. Each of the three essential groups will see the picture differently. To the public health officer, tuberculosis control means preventing the spread of communicable disease, finding source cases, providing facilities for diagnosis and care, public health nursing, contact examinations, clinic and laboratory facilities, hospital beds—with a limited budget; to the individual physician, it is patients needing immediate care, changes on X-ray plates, bacilli found in sputum, bed rest, pneumothorax, streptomycin, surgery and patients' fear and worry; to the tuberculosis association it is community organization, health education, publicizing the problem, and motivating the public to act for its solution. To all it is the same picture, but the focus is different. Working together begins with pulling the focus out so that for each of the three groups there is clear vision of the whole. No matter what the enthusiasm of one group, how sharp its focus, unless all three see the whole, the undertaking labors under a handicap from the start.

In one instance a letter from a private physician to the local tuberculosis association helped start thinking in which six local health departments, three tuberculosis associations, the entire county medical society, and the State health department became involved. When it was evident that they were thinking about a job that none of them could handle alone, or even with combined forces, the health officers requested the Division of Tuberculosis of the Public Health Service to help.

The Division of Tuberculosis of the Public Health Service has been taking part in community-wide surveys since 1946. The simplest way of expressing the part it takes is to say that it lends X-ray machines and men to operate them and it provides consultants who help plan and conduct the survey (fig. 1). The consultation for a

TECHNICAL EQUIPMENT AND MATERIALS

22 photofluorographic units (18 for locations, 4 spares, 7 mobile, 15 transportables).
1 14″ x 17″ X-ray machine.
3 trucks for moving portable equipment.
1 large van for transporting equipment and materials from city to city.
4 automobiles for checking locations, transporting key people, etc.
2 jeeps for repair crew.
5 viewers for reading films.
315 rolls of 70 mm. films.
5,000 14″ x 17″ films.

PERSONNEL

Professional and Technical:

2 health educators who provide both consultation and service.
4 physicians to read films.
1 chief technician.
1 technician to supervise unit operations.
3 technicians to check locations and schedule equipment.
1 technician to supervise movement of equipment.
3 technicians to service and repair equipment.
1 technician to operate 14″ x 17″ unit.
2 technicians for darkroom (70 mm. and 14″ x 17″).
28 technicians to operate 70 mm. units.

Consultants (furnished for varying lengths of time before and during survey):

1 medical officer.
1 public health nurse consultant.
1 medical social work consultant.
1 records consultant.
1 health educator consultant.

Other:

1 equipment and supply officer.
1 records supervisor.
1 records analyst.
sufficient clerical staff for registration at units and for processing basic records cards. (Usually between 50 and 60.) These are employed locally.

Figure 1. Equipment and personnel provided by the Public Health Service to keep 1 team of 18 photofluorographic units in daily operation (city of 100,000).

survey has a special focus created by a specifically timed action program, but essentially it is the same kind of service given by Public Health Service consultants whenever State and local health departments ask for assistance in their attempts to improve practices in tuberculosis control.

X-raying the adult population of a city of 100,000 or more within a short time requires so many machines and technicians that it is most unlikely that any city of itself will have these facilities. The investment in X-ray machinery alone is prohibitive; the outlay for a survey team of 18 units is over $300,000. In a smaller population area, it is quite practical to concentrate the available units of the local and State governments to X-ray everyone within a few months, but in large metropolitan areas it is logical for the Federal Government to lend a hand. Since the tuberculosis death rate in cities of over 100,000 population is higher than in other areas, one important activity of the Public Health Service, Division of Tuberculosis is to help urban centers with tuberculosis case finding and follow-up of suspected cases. One health officer commented that it would take 5 years to X-ray his community with the available equipment and personnel. With the help of the Public Health Service, a community-wide survey was completed in 4 months.

When a request for assistance in conducting a survey comes to the Division of Tuberculosis, the first step is to review with the local agencies the community resources which can be applied not just to a chest X-ray survey, but to the whole problem of tuberculosis control. There are more than 100 metropolitan areas in the United States with a population of 100,000 or more—and they have as many different compounds of medical, public health, and social services and of rules and regulations which apply to finding and dealing with tuberculosis. The Division has found that every city must be carefully studied in advance in order to help the particular community determine what to do to plan for an effective survey.

In this study and planning, staff members of Federal Security Agency Regional Offices and of State agencies give special help. Consultants in medicine, administration, public health nursing, medical social work, public health records, and community organization from the Public Health Service who have had much experience in surveys pass on this experience to the new area.

The questions which arise in such a study are numerous, and the implications of the answers not always obvious. For example: What funds, space, equipment, and materials are there which could be used for a survey? How many public health nurses are there; what is their case load; will they be able to provide the increased services which will be needed? What medical social services are available? What local laws and regulations help or hinder the care of tuberculous patients?

What determines eligibility for sanatorium care? What resources are there for the medical care of tuberculous patients or of persons with nontuberculous disease like cardiovascular abnormality or cancer of the lung? Is there a tuberculosis case register; how is it kept; how can it be expanded to handle twice as many cases? What procedures are used for reporting cases? Is the interest in a survey widespread or is it fostered by only a few individuals?

This presurvey study gives local voluntary and official agencies an opportunity to review their activities together and to evaluate the accumulated force of combined programs, and thus to assess the city's strength and weakness in tuberculosis control. The study is conducted long before the survey—months or even years in advance of actual X-ray operation. Sometimes the needs that the assessment highlights are remedied easily; sometimes the remedy takes much time and effort. Deficiencies are usually a result of limited budgets, inadequate staff, or lack of facilities, and the ways to remedy them are not easy to find. But the concerted community effort that survey planning involves is frequently able to overcome difficulties.

In one city, the combined interest of the medical society, the health officer, influential citizens, and an active State tuberculosis association brought about extensive improvements. The limited nursing staff in the health department had only recently assumed responsibility for tuberculosis nursing. There were no laboratory facilities in the health department. The only chest clinic in the community was at the tuberculosis hospital and it could not give service even to all the tuberculosis patients then known, and could not possibly have taken on the added case load resulting from a survey. But ways and means were found to provide additional nursing services, additional beds for tuberculosis patients, and a diagnostic clinic to take care of the survey case load. As a matter of fact, it was because an insurance company paid the postage for mailing survey reports that money originally budgeted for this purpose could be used to finance the construction of the diagnostic clinic.

In another city, survey planning made possible increased medical services in the city chest clinic through lengthened clinic hours, and more public health nursing for tuberculosis through added staff and rearranged schedules and assignments. Recommendations like the following may appear in the pre-survey planning report of the Public Health Service nursing consultant and the local health department nurses: "That a detailed study of the total chest clinic facilities, policies, and procedures be made and the recommendations acted upon. Extension of services and enlargement of facilities will be necessary to assure successful case finding and follow-up." Such extension and enlargement are not easy to manage, but they can be done.

In seven cities, survey planning led to provision for the first time of medical social services for tuberculous persons and their families. In Washington, social workers were assigned to the survey for 8 months, so that at least one medical social worker could be on duty in the central chest clinic at all times. In-service training for health department personnel is usually arranged. Laboratory technicians from one health department, for instance, went to the Public Health Service Tuberculosis Evaluation Laboratory at the Communicable Disease Center in Atlanta, for a refresher course in tuberculosis laboratory work.

Occasionally, the pre-survey planning shows up obstacles which make the survey impractical for the present. In one city, the consensus was that the survey should be postponed until a case registry had been developed; in another, the survey was not started until the public health nursing staff had been increased.

No large municipal area has ample facilities. Most cities still need many additional hospital beds. But this alone is no reason not to do a survey. The individual with tuberculosis has a much better chance of getting well if his illness is discovered and he has medical care, even if he cannot go to a hospital. Furthermore, while isolation in the home is probably never completely satisfactory, the doctor and the public health nurse can help the patient protect his family and contacts. Since the person who does not know he has tuberculosis does nothing to help himself or to protect others, finding unknown cases is an effective control measure, whether or not there are enough hospital beds for all of them. When the community knows the actual need, a stronger incentive exists for providing an adequate number of beds.

If by a concentrated program of case finding the majority of persons in the city who have tuberculosis can have medical supervision it follows empirically that ultimately fewer persons in the community will contract tuberculosis. The survey is therefore an investment in the future of the community, as it is in the future of each sick individual it discovers and brings under care.

When the survey is arranged, the Public Health Service tuberculosis consultants suggest detailed patterns of organization, promotion techniques, and survey procedures. At this time, the sponsoring agencies together define the areas of responsibility of the various participators in the survey. This is the point at which it is determined who will take on financial obligation and executive management. The responsibilities of the medical officer-in-charge of the Public Health Service team to be assigned to the survey are clearly stated. Such matters as timing the survey and geographic areas to be covered are decided. Agreements are made in detail about personnel and equipment the Public Health Service will provide, and the services and responsibilities which will be undertaken by local groups. The Public

Health Service says it will send in 18 X-ray units, a 14″ x 17″ X-ray machine, film and record cards, and that trained physicians will supervise the Public Health Service team and interpret the X-ray films The local sponsors state what staff they will provide to survey headquarters. The Division agrees that consultants will be available for nursing, medical social service, records, health education. The local health department agrees that follow-up services will be made available to persons needing care. When all the details of who will do what have been determined, an agreement is drawn up and the survey organization can begin to crystallize.

While the actual survey organization varies somewhat from one city to another, there is a general pattern which is illustrated in the chart (fig. 2). The organization is developed to carry out this particular concentrated public health project and is adapted to survey needs and objectives. The three sponsoring agencies (health department, medical society, tuberculosis association) set up a board of directors which includes civic leaders and representatives of various contributing organizations. The board is the corporate body of the survey and assumes both leadership and responsibility in its operation. An executive or administrative committee is appointed to carry out the directions of the board and usually the chairman of the board also acts as chairman of this committee. The three sponsoring agencies are represented on the executive committee, and the chairmen of the various committees of the survey are also members. The managing director may be a person who works for one of the contributing organizations and is assigned to the survey, or he may be employed directly by the survey.

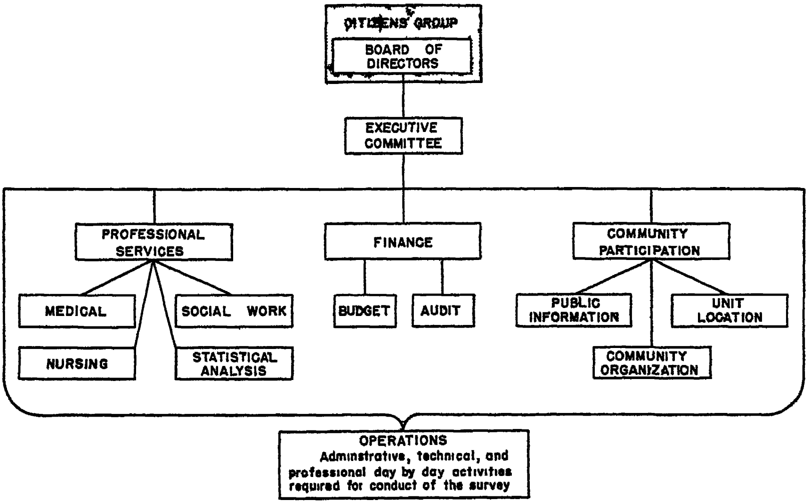

Figure 2. Sample survey organization chart.

The members of the finance, professional services, and community participation committees and their subcommittees are citizens who contribute their time and skill to make the survey a success. The chairman of the finance committee may be a local banker or certified public accountant; the medical committee is made up of local doctors; the public information committee may be headed by an advertising executive or the manager of a radio station.

When the survey has been incorporated, space for headquarters is obtained and altered to accommodate the survey. Telephones and switchboards are installed, offices and the various other working spaces are laid out and partitioned. The retake center is planned and constructed to give space for individual interviewing rooms for public health nurses and medical social workers. In one city, a local union provided free labor to build a darkroom, and frequently furniture and equipment are lent by business organizations and by military establishments in the locality.

Personnel are gradually brought together into headquarters. Some of the staff are hired directly for the survey operation, but many are assigned temporarily by the health department and various contributing agencies in the city. The members of the Public Health Service consultant team arrive early. The medical officer has been available to the health department for consultation on the survey since the early planning. The nursing and medical social work consultants have been in the city for months, helping the health department plan for the expansion of services which will be necessary. They have also worked with local nursing organizations and social and welfare agencies, so that all of the nursing and social work resources of the city are drawn in to work together smoothly. The Public Health Service records consultant has been helping the health department records staff in streamlining the tuberculosis case register and other record systems.

About a month before the beginning of the survey, the chief technician and his staff of 38 members arrive with the X-ray equipment, and proceed to install equipment, set up the darkrooms, check locations, and so forth.

As the headquarters are being organized, both as to furniture and as to personnel, the community is also being organized. Health educators from the health department, the tuberculosis association, and the Public Health Service have been working out plans for community participation. Volunteer committees begin to help out with publicity, to canvass the city block by block, to arrange for speakers at clubs, to enlist the support of businessmen, and do the myriad other things which will make the survey community-wide.

Thousands of details must be dealt with before the survey's first X-ray is taken. Even the physical fact of placing a mobile unit on a given corner represents a series of decisions and arrangements. The big silver trailer truck standing in the middle of Pershing Square in Los Angeles attracted a lot of attention, when it appeared one foggy grey morning. The Locations Committee of the survey organization had decided upon Pershing Square as a good place for an X-ray unit—a central location convenient for many people, in an open space where traffic would not be held up. Since such use of the Square had never been permitted, the Committee was assured that the city fathers wouldn't "hold still for it." "You can't get power into the Square," was another objection. But the Committee had checked and discovered that lines could be connected to an underground outlet and carried to the unit over the trees of the Square. "It will tear up the lawn." But the Committee promised that the trailer would be empty and light when it was moved in. The permission was given. A section of the concrete railing around the Square was removed in the early watches of the morning, the truck moved in, and the railing replaced, to mystify early sidewalk superintendents who wanted to know how that truck got in there.

When the trailer arrived, three men from the power company were on hand to stretch the cables and set up the installation. Power is a problem to any survey operation, and when the survey is city-county-wide, there may have to be as many as 50 installations in 5 days. The survey electrician sometimes works nights or over week ends so that installations will be ready at scheduled times. When a large urban area is surveyed in a short period of time, much of the incidental work is done outside normal working hours. In Sugar House, a suburb of Salt Lake City, a group of businessmen got into their jeans and worked one week end building a structure in the Plaza to house a unit.

Although the units in downtown areas take a great many X-rays, they are not convenient for all the people. Consequently, mobile units are placed for various periods of time at strategic corners in outlying neighborhoods, or merchants allow portable units to be placed in their stores.

Portable units are also used in schools, and in factories, where both management and labor, recognizing the value of chest X-rays, cooperate in arrangements for survey of all personnel. Even factories present special problems sometimes. In order to X-ray the 11,000 employees of an airplane factory, it was necessary for the technicians and clerks to be investigated for security purposes.

Before any of the units are in operation a great deal has been done to arouse public interest, because a community-wide survey is directed at the entire adult population. It is not too difficult to plan surveys for "captive" groups in schools or factories, but a great deal of organization is required to X-ray all the butchers, bakers, candlestick makers—and their sisters and their cousins and their aunts. For some 6 weeks before X-raying begins, the survey has been written up in the press, talked about on the radio, perhaps announced in theatres. Publicity has been informative about tuberculosis and about the importance of periodic X-ray for early diagnosis. Emphasis has been placed on the communicability of tuberculosis and the fact that it may hit anyone. The survey is explained as an opportunity for every person in the city over 15 years old to have an X-ray, and all adults in the area are urged to take advantage of it.

With the beginning of the survey, when the units are in place, the process of letting people know about it is pushed up to full speed. Radio spot announcements give frequent reminders through the day: "Have your chest X-rayed! You'll be doing your part to protect *your* health as well as your family and friends. It takes only a minute for a chest X-ray!" Posters blossom in store windows, in streetcars and buses, and on billboards. Church-goers hear about it from the pulpits, and children carry home notes from school urging their parents to be X-rayed.

When the units are placed and the entire community is informed about what they are for, X-raying begins. Sometimes the first person to be X-rayed in a downtown unit is the mayor. One city opened the survey with a parade, complete with brass band and blown-up rubber animals. In Los Angeles, Charlie McCarthy had the first X-ray.

In most neighborhood locations, the work begins with less fanfare and no movie cameras. People come to have their X-rays, singly or in groups—housewives on their way to the grocery, merchants who take a few minutes away from their stores, employees whose bosses think it's a good idea and send everyone to be X-rayed.

What happens all day long at the unit is pretty much the same wherever it is placed. There is a hostess at each unit who holds coats, answers questions, and assists the technicians in many ways. In one city the stewardesses of an airline acted as hostesses.

People who come for X-rays are greeted by the hostess and then present themselves at the clerk's desk where she enters name, address, and age on the record form. Sometimes men, but more usually women, demur about giving their ages, and the clerk explains the statistical usefulness of having a record of the ages of people who are X-rayed. The clerk is a trained employee of the survey, a local person who has been taught how to deal with the questions that will be put to her. When the clerk completes the card, she returns it to the X-rayee who presents it to the technician. He stamps a serial number on it and slides it in the machine to be photographed with the X-ray, so that there can be no slip-up in identification. The technician, who is a part of the Public Health Service loan to the survey city, not only knows his machine, but has had experience in dealing with the public.

As one technician said, "I was speaking Italian all morning and Yiddish all afternoon." In two minutes the citizen has had his X-ray and learned from the technician that he will receive a report on it within a couple of weeks.

As many as 800 X-ray films can be taken daily by each unit. At the beginning of each day, the camera is loaded with 100 feet of film. The utility box, which contains a numbering machine, pen and ink, paper clips, rolls of film, record cards, and alcohol and gauze for cleaning the chin rest on the X-ray machine, is replenished. A messenger makes a daily trip to the unit to bring supplies and to return exposed films and record cards to survey headquarters. Once a week, the messenger also takes in to headquarters the radiation badges containing dental film, which are worn by unit technicians. These are sent to Washington where a physicist develops and compares them with a standard to make sure that radiation exposure is within safe limits.

In the scheduling room at headquarters, the walls are covered with huge maps of the city, stuck with red pins to show where the units are. This is the control room for the continuous maneuvering of 22 units (18 in operation, 4 spares) some of which stay in one location only 2 days. Local people who know the neighborhoods pick corners where the take will be good, and the Public Health Service technician figures out the mechanics of placing units in such profitable spots and getting power to them when they are placed.

The publicity office at headquarters is the source of the continuous effort needed to get repeated front page attention from city editors.

All the films from the 18 units and the retake center are delivered to 3 technicians in the darkroom. For a community-wide survey the darkroom is equipped with extra large tanks for developing and washing as many as 8,000 small and 180 large films on one day. They are read without delay by Public Health Service physicians and the cards are passed on to the records room for processing. Ordinarily, people receive word about their X-rays in less than 15 days. When they are sent to the records room by the physician, the cards for about 96.5 percent of the films are marked "essentially negative," and the return mailing portions of these, printed with a negative notification, are detached and put in the mails. "Tuberculosis is a disease that spreads from person to person," the card reads. "An X-ray about once a year will help you make sure you have not caught it."

The remaining cards will be marked S_1, S_2, S_3 for films showing suspected tuberculosis (S_1 indicates strong suspicion of active disease); O for films showing other chest disease; C for suspected cardiovascular disease; and U for unsatisfactory films. If the physician considers a case urgent, it is referred to a public health nurse for special handling. Otherwise appointments for 14″ x 17″ films are made at the retake center, and appointment letters are sent out. Since every effort is made to accommodate people, appointments are frequently adjusted.

The public's acceptance of the program is the special concern of the health educators, whose office is also at survey headquarters. The number of organizations which take part in the survey sometimes runs into the thousands, and the health educators are constantly in touch with them. They attempt to arouse in the community awareness of the personal and public health problems of tuberculosis and a lasting interest in solving them. The health educators also are responsible for marshalling volunteers who keep all the units staffed with hostesses and for making sure that the hostesses know all the answers they need for the questions they will be asked.

In the film reading room a group of local chest specialists go over the 14″ x 17″ films from the retake center twice a week. These men give their time with traditional generosity. While it is sometimes difficult at first for busy doctors to see how they can find time for such a project, the variety and significance of the films to be read excite their interest. Three to five physicians serve as consultants in most cities, but they are often joined by colleagues who are glad of an opportunity to examine more kinds of chest X-rays than they might come across in years of practice. The active participation of the medical profession is indispensable to the effectiveness of the survey, not only in reviewing the films, but also in follow-up, diagnosis, and medical care for persons whose films show evidence of disease. Specialists often keep in touch with the survey medical staff throughout the survey. In Boston, the survey organization received follow-up reports on patients who had been referred to physicians in Montreal, Virginia, New York, and Vermont.

The medical men who work with the survey organization also assume responsibility for keeping their colleagues in the community informed about the survey, the recommendations of the medical committee on the management of cases found, and the services which have been made available for physicians and their patients. In Seattle, Boston, Spokane, Denver, and San Diego, articles explaining the survey appeared in the county medical journals well in advance, and in other cities, brochures were distributed to all physicians, and the survey was discussed at medical society and hospital staff meetings.

The retake center may or may not be at survey headquarters, but it is a part of the survey operation's center. The 14″ x 17″ films which are the second step in the survey screening are taken there. A public health nurse talks with each person who comes to be X-rayed to get information from him which will help determine medical recommendations, and to try to make him feel the importance of following through with other examinations which may be recommended. At this time, she finds out the name of his own physician to whom a report of the 14″ x 17″ X-ray will be sent if it indicates the need for further study.

Procedures mapped out by the professional services committee of the survey and the health department determine what happens after the 14″ x 17″ film has been interpreted and found to indicate some abnormality. These basic procedures are the joint concern of people working in health and social agencies and hospitals offering tuberculosis services: physicians, nurses, social workers, laboratory, and records specialists. While the responsibility for diagnosis and treatment is, by and large, carried by the private practitioner, there are many problems that must be solved to give him the support he needs. In Seattle, the health department offered the doctor public health nursing service for his patients. In Boston, one of the medical social workers was provided by the Massachusetts Division of the American Cancer Society to be responsible for following up all cases where the 14″ x 17″ film showed signs of cancer to make sure that patients saw their physicians promptly. In Minneapolis, a rearrangement was made of the work done by the city health department laboratory, so that adequate service would be available to physicians who needed bacteriological studies for their patients.

The city-county-wide survey is a highly complex enterprise which represents the combined thought and effort of hundreds of people. Whether you look at it from the retake center, or the trailer unit in the main city square, or the one at the corner of 200th Street and Z Avenue, you might be reminded of the comment of a very old lady who stood looking at an X-ray unit in Columbus, Ga. "I seen a lot of things in my time," she said. "I seen Yankees coming across that river. But I never seen a thing like this!" And she stepped up to have her chest X-rayed.

Human Relationships in Tuberculosis

By Jerome Hartz, M.D.*

The emotional reactions of a patient to tuberculosis do not begin when he enters a sanatorium or even when he is first told of the diagnosis. These reactions begin far back in childhood, but he is brought to sudden and often shocking awareness of them by the news that he has the disease. He may have had some contact with tuberculosis itself in his past; if he has, he will have developed a set of attitudes that he may or may not be aware of, but which will certainly influence his behavior from that moment on.

The personal attitudes of the patient are important in the treatment of any disease in which the patient's cooperation must be elicited. The more chronic the illness, the greater importance these personal factors assume. Osler summed up the situation in tuberculosis when he said, "It is just as important to know what is in a man's head as what is in his chest if you want to predict the outcome of his pulmonary tuberculosis."

Recalcitrant patients are an obvious example of the importance of personal attitudes in the treatment of the disease, but this discussion is aimed not at that problem, but more generally at a review of some common attitudes in tuberculosis—their sources and some suggestions for their management.

For a great many centuries tuberculosis has been regarded as a threat to life and to economic and social status. The disease still has the power of evoking severe anxiety. The campaign of health education which the National Tuberculosis Association has carried on for several decades is of great importance, but its effect is still pitifully small when measured against the mass of human experience and prejudice of the centuries. In almost all of us there has been built up, more or less unconsciously, a vague impression of the disease—compounded of such things as half-understood references in grown-ups' conversations, the unspoken attitude of pity and dismay that the whole block felt when the neighbor next door had to leave home and go away to rest, the mysterious decline of the gently coughing heroine in fiction and drama. All of these things are filed away in a growing child's memories, not subjected to critical judgment but ready to be called up years later when he himself may be threatened.

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The best example of the persistence of these attitudes into adult life is probably found among medical students or nurses when they develop the illness. They have been taught the modern facts of tuberculosis in a clear, objective way and should be expected to react reasonably and calmly. Yet I am willing to guess that your experience corresponds with mine—some of the most irrational responses to the disease occur just in this group. If one discusses the matter confidentially with them, one soon detects that one reason they have become interested in medicine as a career is because, as individuals, they were often particularly anxious about health matters in their childhood. Apparently these half-understood or misunderstood experiences had made a particularly vivid impression during those years.

Because of the traditional and obvious association of tuberculosis with squalid living conditions, poor habits of human hygiene, and conditions of strain and overwork, it is often believed in our culture that the disease attacks only failures—people who conspicuously have not made a success of life.

In other cultural groups in which the moral force of the Old Testament makes itself harshly felt, tuberculosis is frequently conceived of as a punishment for sin, and the diagnosis evokes a vague but powerful sense of guilt. In patients who privately suffer these guilt feelings, one often sees a reaction of angry bewilderment because they cannot discover a palpable sin on which to pin their guilt.

It is internal emotional reactions such as these that lead to the not infrequent experience of seeing a patient stunned when told the diagnosis. I recall one young woman who came to a doctor after a long series of bitter quarrels with her mother and a hostile brother. When she was told she had tuberculosis, she was stunned and never heard another word the doctor said. She later said she felt as if she had been struck by a thunderbolt which seemed like a punishment from God for her outspoken bitterness toward her family. Forgetting her hat and coat, she left the doctor's office and wandered around for an hour in a heavy snowstorm until she was suddenly brought to her senses because she was almost run down by a car. To those of us who deal with such unusual emotional reactions daily, it is not hard to see some suicidal intent on the patient's part, but of course, she was quite unconscious of this at the time.

For reasons such as these, or more simply because of disappointment at having one's career interrupted or the pain of being forcibly separated from family and friends—whatever the specific reasons—it is extremely common and might almost be considered normal, for a patient newly arrived at a sanatorium to suffer a period of mild depression. As a rule, this depressive phase lasts about 4 or 5 weeks, during which period most people seem to resolve the painful experience in one way or another. This mood is then normally replaced by a sense of acceptance of the trouble, followed by a semblance of cheerfulness that usually persists. If, however, the initial depressive mood lasts for 2 months or longer it is, in my experience, an ominous sign of a serious adjustment problem for the patient.

The appearance of cheerfulness which replaces the initial depression is quite superficial. The patient begins to joke about his illness, describes it as a vacation, and boasts about the weight he gains. But hidden underneath this appearance of cheerfulness is a great deal of anxiety. The other patients come to recognize it, and the hypochondriacal expressions of it are received with a bit of a laugh among themselves. Every tuberculosis patient knows of the fleeting pains in the chest that occur before a routine physical examination is due or the slight elevation of temperature for a night or two before a scheduled X-ray.

What is required of the patient primarily is that he lie still and allow himself to be passively cared for. The majority of patients accept this regime in a satisfactory way, put their trust in the sanatorium or in their particular doctor, and uneventfully get well. But practical considerations about the support of one's family or about the ability to return to one's previous occupation after recovery can interfere with or interrupt the patient's cure. These concerns of the patient must always be considered realistically by the medical staff and by the social service and rehabilitation workers. Planning and exploration of solutions to the patient's problems might rightly be begun almost as soon as the patient enters the sanatorium. But this kind of planning cannot be done mechanically and must always take into careful consideration the patient's attitudes, rational and irrational.

For such purposes the medical history is never enough. A personal history must also be taken. This should include a careful review of how the patient was living at the onset of his illness, what factors of personal strain were operative, how he has reacted in the past to threatening illness, what his family's attitude is toward tuberculosis, and so on. This is not a task to be done lightly; it takes as much skill as for a good medical history. It can be performed by the staff physician if he has the requisite skill in interviewing and an honest interest in helping the patient as a person. Otherwise, it might best be done by specially trained personnel such as social workers, or clinical psychologists. Unfortunately, this kind of interviewing has only recently received any serious attention in medical schools, and most doctors are, therefore, inadequately prepared for this task.

The usefulness of this second, or personal, history of the patient is by no means limited to some utility in rehabilitation planning. As one proceeds, the personal history opens up opportunities for helping patients in unexpected ways. Potentially harmful attitudes can be spotted early whereas otherwise they might not be seen until the patient actually gets into difficulties. The adjustment to sanatorium life can be made easier for the patient if it is recognized at the start that he may be a lonely, introverted person for whom privacy is a sine qua non of peaceful existence or that an immature, dependent adolescent girl will be able to stay in the sanatorium only if she is placed in the company of a good-humored older woman who will help make up for the mother the girl misses so much.

I should estimate that about one-third of tuberculosis patients will be found to have emotional problems disturbing enough to give rise to serious difficulties in treatment. But without careful investigation, the individuals in this one-third minority may not be easily discovered.

There is, for example, the kind of patient who does very well for a while, only to run into trouble later. He is reserved and uniformly polite when the doctor discusses the situation with him; he listens to what he is told and follows directions without any display of emotion. He is likely to have an uneventful time as a patient—in short, he may do well and go home promptly. To the observant eye there are, however, a few things about this kind of patient that are provocative of attention. He rarely talks about his illness, he seems to keep himself busy and occupied with personal things, and he manages to avoid associating with his fellow-patients as much as possible without seeming to shun them openly. This kind of patient leaves the sanatorium ostensibly well, but is apt to be back again in 6 months.

On his return he appears quite different in behavior and attitude. He is openly concerned about himself, wants as much reassurance as he can get from the doctor and nurses, and seems almost dependent on the good will of the patients he previously avoided. The solution to this mysterious change is not hard to find. Our polite and reserved patient of the first illness had no reason to feel concerned; he simply was convinced that he never really had tuberculosis. Even if he had had a positive sputum on his first admission, such a patient usually rationalizes to himself that the sputum specimens were confused in the laboratory or that there were so many germs in the air from other patients that quite naturally a few might have landed on his specimen. But he keeps all of these rationalizations to himself; and when he leaves the sanatorium, he acts on his conviction that he has never really had tuberculosis at all. He pitches right back into full-time work as soon as he gets out and rapidly works himself into a relapse.

This kind of disbelief in the diagnosis occurs in certain very rigid, egocentric personalities who are accustomed privately to overvalue themselves and their opinions absurdly. When this egocentricity is momentarily but finally shattered by the inexorable facts of illness, these patients tend to behave in a most infantile and dependent way. What makes this patient so dangerous to himself and others is his ability to ignore a pneumonia or even a frank hemoptysis if he is really convinced of his own invulnerability.

Another group of patients are those who do very well through most of their hospital stay, but who manage in some remarkable fashion to develop a pleural effusion or a spread of disease a week or even a few days before their expected departure from the sanatorium. This can happen, of course, to anyone, but when it happens two or three times in succession to the same person, it becomes something other than mere coincidence. Investigation of this group reveals that, for many of these patients, the hospital is a refuge from trying or unbearable situations at home, and becoming ill all over again seems more bearable than going out to face an insoluble conflict.

I recall a young physiotherapist who originally had a small amount of disease which she handled extremely well on bed rest. The lesion had almost disappeared when her X-ray 1 week before leaving showed a spread to a new area. Again in bed, the patient did quite well, only to have almost the same thing happen some months later. Observation of the personal problem involved threw some light on the matter. The patient came from a small town where she had been engaged to marry a man she really found quite repulsive; the wedding was to occur immediately after she left the sanatorium. What made the whole matter so unbearable for the patient was that for years she had been tormented by homosexual doubts about herself; and her agreement to marry her prospective unattractive mate was, in large part, an effort to still these doubts within herself. Each time she was ready to leave the sanatorium she fell into great emotional turmoil and, to her apparent surprise, these periods of turmoil were promptly followed by a relapse.

Some patients of a very passive personality type give up trying and sink back into a kind of acceptance of fate that is little short of chronic invalidism.

The effects of emotional turmoil of a serious nature can be seen more clearly in the following example. A 19-year-old single girl was admitted to the sanatorium with bilateral disease and a cavity on one side. One lung was collapsed by pneumothorax, and the patient did remarkably well during the next 10 months. During this time she seemed contented and was, in fact, a kind of prize patient. Suddenly, however, she began to complain of severe anxiety symptoms, vomited frequently, slept poorly, and trembled constantly. When she lost 10 pounds in a week, the staff became quite concerned that her tuberculosis, which had healed so well, would soon break down. A psychiatric consultation was requested.

The medical history threw no light on the sources of the current difficulty, but the personal history of the patient gave a rich understanding of the causes of her anxiety. At the time the patient became ill, her mother had become psychotically depressed over her daughter's illness. For the 10 months the patient had been at the sanatorium, the mother had been too ill even to write her. The patient's anxiety attacks began the day she received a letter from her mother saying that she was feeling better and was planning a visit to her daughter at the sanatorium. The girl envisioned a repetition of her mother's previous nagging demands for affection; and indeed when the mother appeared a few weeks later, she at once demanded that her child leave the sanatorium and come home to stay with her.

In discussions with the patient, it had quickly become clear that the sanatorium seemed to the girl like a peaceful refuge; she had been extremely unhappy at home under the rigid domination of her mother and an octogenarian grandmother. The prospect of returning to their care while she was still convalescing frightened the girl. When the situation had become clear the problem was discussed with the patient's father, but he did not believe he would be able to do very much about it.

The patient did stay at the sanatorium until she was relatively strong and the disease appeared quiescent. She then went home to her mother. Within a month the girl returned to the sanatorium. Her mother had been committed to a mental hospital, and the girl had developed a new spread of disease. In spite of this experience the patient again went home when she had completed her second cure, and almost the same things happened again. This time the mother made a suicidal attempt in front of her daughter, and the daughter quickly relapsed.

This see-saw struggle continued for more than 4 years and, when the patient left the sanatorium the last time, she had a thoracoplasty on one side and a pneumothorax on the other. However, her determination to break away from her family was eventually realized; she married and has subsequently stayed quite well.

Many of the difficulties that patients experience in the process of getting well from tuberculosis center around the issue of accepting the dependent role without serious feelings of guilt or anxiety. Most people can adjust to the sanatorium regimen easily when they realize that they are really ill and that it is to their advantage to do so. To some patients, however, there are dangerous or degrading connotations in this idea, and in certain extreme instances the idea of passive acceptance of someone else's care is absolutely unacceptable and gives rise to a battle sometimes fought to a termination fatal to the patient.

Before we continue with a description of such extreme examples, let us consider a case of the so-called "good" patient, one who lies quietly in bed for months, eats what is put before her, and does not demand extra privileges or otherwise disturb the routine. The regimen appears to be perfectly acceptable to the patient, but from her point of view it leads nowhere and provides no incentive to get well.

A 35-year-old woman had spent more than 2 years in bed because of bilateral disease that slowly improved but from time to time spread again on one side or the other. Her sputum was positive with a low Gaffky count. She was a fine, cooperative patient who did just as she was told and yet at times would develop a cavity on one side and then on the other while lying in bed. There was no doubt of her disobeying; all evidence pointed to the fact that she was an exceptionally conscientious patient who bore the fact of her very slow progress with great patience and fortitude. She was not acutely ill any longer, but she was certainly far from well.

In this situation the problem of how to proceed with treatment was solved by finding out what her emotional adjustment to her disease had been and proceeding logically from there. Briefly, she was a woman who had become ill after a 10-year battle to save her husband from public disgrace and loss of position. He occupied a position of great trust which he would instantly have lost had the extent of his alcoholism ever been publicly realized. So his wife covered up for him in all conceivable ways when he was on drinking sprees, going without sleep for 36 hours if necessary to make sure that no one reached her husband at such times. She even successfully concealed the truth from their children. Gradually she had taken over the management of a large part of his affairs and had done very well.

After 10 years of this hectic kind of existence, she developed tuberculosis. Then she felt sure that all of her efforts were in vain, especially when her husband almost at once became interested in another woman whom he had hired to fill the role his wife had been playing in the management of his affairs. At the height of this emotional crisis, the husband died of a heart attack. The wife was left feeling as though there was very little point in her getting well. The children were being taken care of by her late husband's family, and she felt that she had been badly cheated and defeated by life. It was in this mood that she continued the cure of her tuberculosis—on the surface cooperative and pleasant, but underneath feeling rather bitterly resigned to her passive role that seemed to be so symbolic a measure of her defeat.

On reviewing her life, it soon became clear that ever since she had been a small child she had been putting herself in the role of watchdog and savior. Her own father had been a severe alcoholic. The patient's mother died during the patient's early teens, and she had been the one to keep the family together and take care of her drunken father. When she grew up, she became a nurse who was really interested and at her best only when assigned to the gravest cases. Her whole married life had been a succession of threatening catastrophies which she had always managed to avert just in time. She had, of course, been intensely active all of her life, and there were many things that pointed to the fact that her seemingly relaxed acceptance was only an acceptable way of covering up her despair. For example, when I first went to see her, I noticed a small lettered sign on her door, put there by the other patients, and neatly explanatory of the kind of person they thought she really was. The sign read merely "Executive Officer."

So, on the assumption that this woman needed more activity to restore her self-esteem, she was taken off complete bed rest and slowly started on exercise. Within a couple of weeks all her good spirits returned, her indolent cavity closed, and her sputum became negative. The goal she was now pursuing was to get her children back and settle down to take care of them. In 6 months she was able to undertake a few hours of work, and within a year had her family together again and was working enough to support them. As the patient somewhat later phrased her experience, "For a long while I lay there and expected to get well, but now I see I had no incentive to do it. The difference was between expectation and hope; when I wanted to get well, I put my whole self into doing it."

Now we must turn our attention to the graver aspects of the problem—to those patients who seem to refuse to cooperate in their treatment and in whom the wish to die is either tacitly implied or, sometimes, even explicitly stated. This group is fortunately quite small, but it contributes some of the most difficult management problems in the treatment of tuberculosis. Experience with this group also throws some light on a question which has been raised by a number of observers, namely, why is outright suicide so rare among tuberculosis patients? After considering the following examples, I believe you will agree that the illness itself is often conceived of, or viewed unconsciously by patients, as a gradual suicide; there is, therefore, little, if any, compulsion for them to make a dramatic final gesture. This is not a simple matter from the standpoint of the emotional involvement, but an example or two may clarify some of the factors at work.

A 25-year-old man developed tuberculous pneumonia soon after he was sent overseas to join an active fighting unit in the recent war. When I first saw him, he had been under treatment for 2 years. He told me that he was totally uninterested in getting well and said frankly that he'd be "better off" dead. He had been advised that his only chance for recovery was through an extensive thoracoplasty, which he had flatly refused. Bitterness was the outstanding characteristic of what little he said, and he bluntly told me I was wasting my time in talking with him. However, we did get started, and he gradually revealed enough to let one see some of the sources of his feelings.

The patient was a capable, intelligent, and well-educated young man, the only child of wealthy parents. His mother was a cultivated and attractive woman who was quite talented in the arts; his father was a successful, highly regarded banker. They were willing and eager to give whatever their son needed to be restored to health. But the patient quickly made clear why he had no interest in his own future; the explanation was rooted in his past.

From the early days of their marriage, his parents had been unhappy together but had not separated because of the child. The father had largely ignored his son except that he was always willing to buy the boy anything he wanted. The mother had turned all her interest to the son and had striven to make him the "gentleman" that she obviously believed the father was not. So for the first 7 years of his life the patient was raised most delicately, wearing velvet suits and long curls and giving tea parties for little friends his mother invited. Added to this overprotection was an extreme hypochrondriacal concern about her son's health that led the mother to keep him in bed a week if he had the slightest cold, to overdress him absurdly in winter, and so on. All of the boy's playmates considered him a perfect sissy, and he went through his early life sadly convinced that they were right.

At about 14, however, he was finally accepted among his peers because he owned a sailboat and had learned to sail. Thereupon, he changed into a most muscular kind of water-rat and prided himself on the roughness of the sailors and other persons with whom he associated. Swimming and sailing became to him the measure of a successful existence, and he decided on a most active occupation as a career.

The war came along and the patient made an enthusiastic soldier until it came time to fight; then he broke down with tuberculosis. When he was told his diagnosis, the patient's whole elaborately built-up structure of mannishness collapsed in a moment. He was immediately convinced that he could never again lead an active life and that surely no self-respecting girl would marry a broken-down consumptive like himself.

Worst of all, this illness delivered him again into the hands of his over-anxious hypochondriacal mother, and this time he felt really helpless against her. The whole of the 2 years he had so far spent in bed was divided into periods when his mother hovered over him and other periods in which he succeeded for a time in driving her away. On one occasion he saved up enough sleeping pills to make a suicidal attempt, but characteristically he did not take them, using them only to frighten his mother. During this time the patient's lesion gradually grew worse and, as it did, his mood grew more bitter and depressed.

Our discussions together did not alter his viewpoint radically or quickly, but toward the end he could admit occasionally that not all thoracoplasty patients were cripples and that some of them even lived slightly useful lives. Bent on self-destruction as he was, nevertheless during the weeks of our interviews he slowly gained some weight and admitted grudgingly that he felt a bit better. However, he refused to be budged very far from his original position then, but about 6 months later he did give in and consent to a thoracoplasty.

The broad outline of this young man's emotional conflict is apparent. Neglected by his father as a child, he was thrown almost entirely into the hands of a very neurotic mother. The mother took out her outraged feelings against her husband by doing her best to feminize her son during the early years of his dependence on her. In consequence, the patient came to feel that anything which put him in a dependent, passive position was going to make him into a feminized, weak little boy. When he developed tuberculosis, the patient was being asked symbolically to accept a position that throughout his life experience he had come to associate with all the galling, embarassing emotions of his early childhood. He simply felt he could not accept that struggle again, and the thoracoplasty seemed to him a badge of weakness and a mark of shame in the eyes of the world.

The last patient I wish to mention fits into the same pattern even though the outcome was quite different. She was a 30-year-old married woman whom I was asked to see because her tuberculosis was actively progressing and excavating even after 7 months of strict bed rest and also because her behavior was such that it antagonized anyone who had to treat her. She cursed at the doctors, threw things at the nurses, and made sarcastic remarks about everyone. Because of the character of her disease, collapse therapy was considered inadvisable. Her behavior was somehow tolerated because it was believed that she would eventually die.

Her behavior and appearance were quite striking. She was noticeably masculine in appearance and manner; her hair was cut short like a boy's. Her restlessness was extreme, and her bed was usually in complete disarray from her constant twisting and turning.

Throughout the first interview, she cried profusely and coughed and wheezed a great deal. She was, however, glad to see a psychiatrist and was very eager to talk. She told me that about 10 years before—when she was 20 years of age—she had been very much upset about her first marriage and had felt a strong urge to commit suicide. She had resolved the conflict at that time by getting a divorce, but now she had a great fear of dying and was puzzled whether the two episodes might be related. I said that I thought they might easily be related, and from that point we started. The patient was seen almost daily for about 2 months—the extent of my available time.

This patient's history really might be said to go back at least two generations, for both the patient's mother and grandmother had been extremely domineering, aggressive women, highly successful in fields of activity usually reserved to men. Both the mother and grandmother had married weak, passive men who had dropped out of the marriages before too long. The patient herself had done the same kind of thing at 19. The man she ran off with was a charming alcoholic who never supported the patient or the two children she bore him. At 21 the patient divorced him, took custody of the children, and started out to make her way in the world as her mother and grandmother had done before her. But the economic depression of the 1930's was in full swing and the patient had a difficult time providing for herself and her children. Her early experience had hardened her, however, and she was determined to be as self-sufficient as possible.

Five years before she became ill, the patient met the man who was to become her second husband. For 4 years she put him off but, on his urgent pleading, finally consented to marry him. However, her consent was limited by certain conditions of marriage very characteristic of her: she was to be allowed to continue working and support herself and her children; she was to be allowed to do her own housework after she came home from working all day; and she was to keep the use of her maiden name. For the first year after the marriage she lived up to these self-imposed restrictions. In addition, she fired two people who were supposed to be her assistants at work and characteristically proceeded to do the work of all three.

She was often exhausted, but this did not alter her fierce determination to be independent. The only thing that bothered her was a recurrence of the suicidal thoughts; and for the 6 months before she fell ill, she frequently dreamed of killing herself. About a year after all this overactivity began, the symptoms of tuberculosis appeared and advanced rapidly. The diagnosis was made promptly and she was hospitalized at once. In spite of a regime of strict bed rest, the disease progressed steadily until at the end of the subsequent 7 months it appeared very likely that she would die. She had several cavities, an active bronchial lesion, and a very high Gaffky.

For about 2 weeks after her arrival at the sanatorium she had felt relieved and was glad of the opportunity to rest. But very soon her feelings of rebellion began; she could not accept the need to be dependent and let someone else take care of her. Her whole life had been devoted to proving how self-reliant and strong she was, and she now found herself forced to jeer at and quarrel with the nurses and doctors who were unwittingly demanding that she give up this role.

Needless to say, none of this was apparent to the patient when I first saw her. It came out in the course of the work we did together and constituted for the patient a very important bit of insight. As you will have noticed, also, this patient had great difficulty in accepting her own femininity. Her attitude was that all men are weaklings and depend on women for support, that women were really the strong ones in the world. After we had battled our way through some of these ideas in the course of several strenuous hours, it began to be possible to see why the patient felt this way.

Much of her feeling of loneliness, of being unloved, and of deep pessimism that she had felt in her turbulent childhood came to the surface; and as she talked of these things, her crying and great motor restlessness began to subside. Gradually through this period she began to look more feminine. She let her hair grow and started using lipstick; her relationship with the doctors and nurses improved; and she began taking an interest in other patients. Her general condition seemed less alarming, and at the end of this period she had her first X-ray that showed no further progression of the disease. This favorable trend continued; in 6 months her cavities were closed, and at the end of a year her sputum was negative and she was allowed to get up. Needless to say, this patient required much more psychiatric treatment, and fortunately she was able to obtain it after her return home. This case, then, was that of a severe neurotic reaction that completely blocked the patient's ability to accept the required treatment for her disease and even her ability to get well.

One step further in this series of increasingly disturbed patients is the small group of patients who manage to achieve some precarious kind of equilibrium with severe pulmonary disease but remain chronically ill for years. Included in this group are the patients who rarely become ambulatory or, if they do get up, are soon back in bed for several more years after an immediate and severe relapse. As personality types, these patients tend to be introverted, withdrawn people who use their severe tuberculosis to guarantee care and affection for themselves. They seem to pay scant attention to their disease but usually are the most discussed therapeutic problems in the sanatorium over long periods of time. They would probably be frank schizophrenics if their emotional needs were somehow not being precariously met by the care and sympathy they always manage to get for themselves in the sanatorium.

One such patient confided to me that she had been committing slow suicide during the past 9 years but that none of her doctors had "caught on" yet. This was an entirely conscious but private idea of the patient's, and she seemed to be matching wits with the surgeons who over almost a decade had tried a number of ingenious operative procedures on her—all of which had so far failed.

Another such patient became frankly psychotic 5 weeks after he left the sanatorium. He had apparently arrested his tuberculosis after a 5-year struggle in the sanatorium, during which time he was considered only as a queer, rather eccentric personality. Outside the sanatorium atmosphere, his emotional defenses broke down almost at once and he soon had to be committed to a mental hospital.

The necessity for psychiatric treatment of such patients as those just described can probably be well demonstrated, but a word of caution should be added. It has occasionally been observed that, during phases of acute activity of pulmonary tuberculosis, any discussion which is emotionally disturbing to the patient can give rise to an increase or recrudescence of toxic symptoms such as fever, tachycardia, fatigue, and so on. Therefore, it requires good clinical judgment to be able to estimate when psychiatric work can be undertaken in such acute situations. Thus, if a patient entered the sanatorium in an acute tuberculous episode, and was found likewise to be recovering from an acute mental depression, it might be much sounder procedure to let the patient recover slowly from his depression than attempt to stir up the problem any further. Under such a laissez-faire regime, both conditions tend to improve simultaneously without intervention.

I do not mean to carry this discussion into the technical and special range of psychotherapy in general, but I do wish to emphasize that in tuberculosis hospitals, as in any place in which one deals medically with large groups of people, the psychiatrists' services may aid in solving a particular patient's general medical problem. This kind of psychiatric assistance is *necessary* in only a small minority of cases, but I have tried to point out how psychological understanding is important and helpful during the course of any patient's illness.

The level of interest of staff physicians in these problems has not always been high. Part of the blame for the physicians' attitudes rests on the medical schools, which have done a grossly inadequate job of preparing physicians to appreciate the value of this approach to medical and surgical problems. In addition, most staff physicians are uneasy about handling these problems in direct proportion to their lack of knowledge and understanding of them. This lack of understanding can best be remedied through case demonstrations and discussions. Interest can certainly be aroused and insight developed through seminars and staff discussions of the reasons why a particular patient behaves as he does and by giving attention to the problems of morale of the patients. Such insight has been shown to be of value in many treatment problems—especially those in which there are phobias against such common things as needles, or milk, or exercise, or even against breathing!

Social service and rehabilitation workers do their best work when they have access to a psychiatric consultant. Any planning for a patient is better planning to the extent that it takes into account the dynamics of a patient's inherent motivation. In fact, the whole problem of discharge against medical advice, which is such a plague in some sanatorium settings, can be handled successfully only through skilled and informed work in just this area. Financial support of a man's family of dependents while he is curing his tuberculosis makes very good sense in terms of the eventual cost to the community if he is forced to leave before his cure is completed. Likewise, it seems to me that emotional support of the patient while he is attempting to complete his cure makes equally good sense. In this connection, a few words might be added about the general role of nurses in the patient's care. The nursing staff bears a large share of responsibility in the daily life of the sanatorium patient. Nurses often can use assistance in modifying the sanatorium routine intelligently to fit the emotional needs of their patients; this is particularly true in institutions in which much of the daily burden of treatment is borne by the nursing staff. Under such conditions the patient often feels that the sanatorium is being run for the convenience of the nurses, and the result is extremely low patient morale. An intuitive, understanding head nurse can, however, at times be the best source of aid to a discouraged patient.

The whole topic of human relationships is in need of study and consideration in relation to the problem of control of tuberculosis. Patients all arrive at the sanatorium with some degree of emotional disturbance. Where morale is good and careful thought is given to the range of human personality reactions, most patients will adjust satisfactorily and respond as expected to treatment. However, a large minority can be expected to encounter serious difficulties during or after their hospitalization, mainly because of emotional disturbances. These disturbances cannot always be avoided, but usually their occurrence can be foreseen and their seriousness modified if there has been an adequate personality investigation early in the patient's stay. Likewise, intelligent planning to cope with the social and rehabilitation problems of the patient will go forward much more realistically from such a base. Certainly, in terms of practical management, pulmonary tuberculosis can be as much a disease of the personality as it is of the lungs.

Erratum

In the article, "Geographic Distribution of Pulmonary Calcification Among University Students in Ohio," by John A. Prior, et al., Pub. Health Rep. 65: 1135 (September 1, 1950), the key to figure 1 is in error. The symbols for pulmonary calcification and histoplasmin sensitivity should be transposed; that for tuberculin sensitivity is correct.

Incidence of Disease

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

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UNITED STATES

Reports From States for Week Ended September 16, 1950

For the current week, new cases of acute poliomyelitis reported in the Nation numbered 2,138, a 22.5 percent increase over the 1,745 cases reported last week. This is the seventeenth consecutive week which shows an increase over the preceding week. For the corresponding week in 1949, 2,622 cases were reported. The cumulative total (16,236) for the current "disease" year was below the corresponding total (28,157) for last year, the highest on record. The "disease" year for acute poliomyelitis begins with the twelfth week of the calendar year. The cumulative total for the calendar year was 17,370, compared with the total of 29,072 for the corresponding period last year.

Comparative Data for Cases of Specified Reportable Diseases: United States

[Numbers after diseases are International List numbers, 1948 revision]

Disease	Total for week ended		5-year median 1945-49	Seasonal low week	Cumulative total since seasonal low week		5-year median 1944-45 through 1948-49	Cumulative total for calendar year		5-year median 1945-49
	Sept. 16, 1950	Sept. 17, 1949			1949-50	1948-49		1950	1949	
Anthrax (062)	------	2	(1)	(1)	(1)	(1)	(1)	30	40	(1)
Diphtheria (055)	97	165	210	27th	754	1,129	1,440	3,882	4,897	7,737
Acute infectious encephalitis (082)	24	31	31	(1)	(1)	(1)	(1)	655	510	424
Influenza (480-483)	982	658	658	30th	5,465	3,996	3,996	251,724	79,863	144,358
Measles (085)	518	414	535	35th	1,024	913	1,030	289,195	589,431	552,938
Meningococcal meningitis (057.0)	46	46	46	37th	3,712	3,360	3,613	2,799	2,516	2,641
Pneumonia (490-493)	662	822	------	(1)	(1)	(1)	(1)	63,493	58,861	--------
Acute poliomyelitis (080)	2,138	2,622	1,620	11th	[2] 16,236	28,157	15,313	[2] 17,370	29,072	15,780
Rocky Mountain spotted fever (104)	12	10	11	(1)	(1)	(1)	(1)	406	510	478
Scarlet fever (050)	344	404	445	32d	1,401	1,326	1,982	41,571	58,992	64,085
Smallpox (084)	------	------	------	35th	--------	1	3	26	42	148
Tularemia (059)	17	18	18	(1)	(1)	(1)	(1)	708	887	731
Typhoid and paratyphoid fever (040, 041) [3]	92	108	114	11th	[2] 1,996	2,382	2,382	[2] 2,506	2,870	2,870
Whooping cough (056)	1,889	1,364	2,185	39th	[2] 115,309	53,737	98,303	[2] 93,773	43,704	72,285

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[1] Not computed.

[2] Deductions: Poliomyelitis—North Carolina, week ended Aug. 12, 1 case; typhoid fever—Georgia, week ended Sept. 2, 1 case; whooping cough—Iowa, week ended Sept. 2, 2 cases; week ended Sept. 9, 10 cases.

[3] Including cases reported as salmonellosis

For the current week, six of the nine geographic divisions increased over the preceding week in reported cases of poliomyelitis. These decreases ranged from 173 (397 to 570) cases reported in the Middle Atlantic States to 4 (40 to 44) in the Mountain States. The three divisions decreasing from the preceding week ranged from 30 (161 to 131) cases in the West South Central States to 1 (156 to 155) in the Pacific States.

The States reporting the largest numbers of cases of poliomyelitis for the week were: New York (377), Michigan (135), Ohio (126), Illinois (117), Pennsylvania (112), and California (106).

The total number of cases of infectious encephalitis reported for the week was 24 compared with 31 reported for the corresponding period last year. For the calendar year, a total of 655 cases was reported, the highest total in the past 5 years.

The total of 46 cases of meningococcal meningitis reported for the current week concluded the "disease" year. The current week is the 37th in this calendar year. The cumulative total number of cases of meningococcal meningitis for the "disease" year was 2,799 compared with the 5-year (1945–49) median of 2,641. The largest total number of cases reported in any year during this period was 6,495 in 1945.

No smallpox was reported in the United States.

Of 39 States and the District of Columbia reporting on rabies in animals, 22 States and the District of Columbia reported no cases. The remaining 17 States reported 118 cases. States reporting the largest numbers were: New York (29), Texas (16), and Kentucky (14).

Deaths During Week Ended September 16, 1950

	Week ended Sept. 16, 1950	*Corresponding week, 1949*
Data for 94 large cities of the United States:		
Total deaths	8, 571	8, 508
Median for 3 prior years	8, 312	----------
Total deaths, first 37 weeks of year	340, 246	340, 683
Deaths under 1 year of age	620	640
Median for 3 prior years	640	----------
Deaths under 1 year of age, first 37 weeks of year	22, 937	24, 148
Data from industrial insurance companies:		
Policies in force	69, 591, 583	70, 143, 481
Number of death claims	11, 134	11, 757
Death claims per 1,000 policies in force, annual rate	8. 3	8. 7
Death claims per 1,000 policies, first 37 weeks of year, annual rate	9. 3	9. 2

Reported Cases of Selected Communicable Diseases: United States, Week Ended Sept. 16, 1950

[Numbers under diseases are International List numbers, 1948 revision]

Area	Diphtheria (055)	Encephalitis, infectious (082)	Influenza (480–483)	Measles (085)	Meningitis, meningococcal (057.0)	Pneumonia (490–493)	Poliomyelitis (080)
United States	**97**	**24**	**982**	**518**	**46**	**662**	**2,138**
New England	**2**	-----	-----	**40**	**1**	**15**	**132**
Maine	1	-----	-----	-----	1	2	10
New Hampshire	-----	-----	-----	-----	-----	-----	4
Vermont	-----	-----	-----	6	-----	-----	3
Massachusetts	1	-----	-----	24	-----	-----	62
Rhode Island	-----	-----	-----	2	-----	1	2
Connecticut	-----	-----	-----	8	-----	12	51
Middle Atlantic	**6**	**3**	**3**	**127**	**5**	**144**	**570**
New York	3	3	(1)	38	1	84	377
New Jersey	2	-----	3	48	-----	23	81
Pennsylvania	1	-----	-----	41	4	37	112
East North Central	**6**	**3**	**21**	**131**	**8**	**97**	**473**
Ohio	-----	-----	-----	26	1	-----	126
Indiana	3	-----	-----	-----	-----	6	33
Illinois	2	1	2	28	3	71	117
Michigan	-----	2	-----	32	3	16	135
Wisconsin	1	-----	19	45	1	4	62
West North Central	**2**	**7**	**8**	**8**	**2**	**48**	**249**
Minnesota	-----	-----	3	2	1	24	45
Iowa	-----	-----	-----	1	1	1	104
Missouri	2	-----	-----	2	-----	5	26
North Dakota	-----	3	-----	-----	-----	13	-----
South Dakota	-----	4	-----	-----	-----	-----	6
Nebraska	-----	-----	5	3	-----	-----	25
Kansas	-----	-----	-----	-----	-----	5	43
South Atlantic	**34**	-----	**133**	**18**	**7**	**64**	**287**
Delaware	-----	-----	-----	-----	2	-----	2
Maryland	-----	-----	-----	-----	-----	9	79
District of Columbia	-----	-----	1	-----	-----	8	7
Virginia	4	-----	115	10	-----	21	84
West Virginia	4	-----	15	1	4	-----	10
North Carolina	18	-----	-----	4	1	-----	23
South Carolina	4	-----	1	1	-----	4	22
Georgia	3	-----	-----	2	-----	13	33
Florida	1	-----	1	-----	-----	9	27
East South Central	**19**	**2**	**17**	**14**	**7**	**42**	**97**
Kentucky	1	-----	-----	1	4	7	45
Tennessee	4	2	7	13	-----	-----	32
Alabama	8	-----	6	-----	3	14	8
Mississippi	6	-----	4	-----	-----	21	12
West South Central	**21**	**2**	**724**	**51**	**13**	**202**	**131**
Arkansas	9	-----	33	11	4	14	21
Louisiana	2	-----	1	4	-----	11	16
Oklahoma	2	1	47	3	-----	17	22
Texas	8	1	643	33	9	160	72
Mountain	**1**	-----	**58**	**34**	-----	**19**	**44**
Montana	1	-----	7	3	-----	-----	-----
Idaho	-----	-----	-----	5	-----	-----	12
Wyoming	-----	-----	-----	-----	-----	-----	3
Colorado	-----	-----	7	10	-----	6	4
New Mexico	-----	-----	1	2	-----	8	9
Arizona	-----	-----	43	1	-----	4	12
Utah	-----	-----	-----	13	-----	-----	3
Nevada	-----	-----	-----	-----	-----	1	1
Pacific	**6**	**7**	**18**	**95**	**3**	**31**	**155**
Washington	1	-----	11	9	-----	2	24
Oregon	1	-----	6	14	1	3	25
California	4	7	1	72	2	26	106
Alaska	-----	-----	-----	-----	-----	-----	-----
Hawaii	1	-----	6	2	-----	-----	1

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[1] New York City only.

Reported Cases of Selected Communicable Diseases: United States, Week Ended Sept. 16, 1950—Continued

[Numbers under diseases are International List numbers, 1948 revision]

Area	Rocky Mountain spotted fever (104)	Scarlet fever (050)	Smallpox (084)	Tularemia (059)	Typhoid and paratyphoid fever [1] (040,041)	Whooping cough (056)	Rabies in animals
United States	12	344		17	92	1, 889	118
New England		30			8	229	
Maine		1				60	
New Hampshire						9	
Vermont						17	
Massachusetts		24			8	58	
Rhode Island						38	
Connecticut		5				47	
Middle Atlantic		41			5	383	34
New York		[2] 22			3	156	29
New Jersey		10				133	
Pennsylvania		9			2	94	5
East North Central	1	75		1	13	430	15
Ohio	1	17			7	51	3
Indiana		5		1	1	11	
Illinois		18			2	35	3
Michigan		22			3	219	7
Wisconsin		13				114	2
West North Central		21			1	185	4
Minnesota		1				33	
Iowa		5				63	4
Missouri		4				17	
North Dakota						22	
South Dakota							
Nebraska		9				16	
Kansas		2			1	34	
South Atlantic	4	66		2	13	180	16
Delaware						1	
Maryland	1	4			3	37	
District of Columbia					2	4	
Virginia	1	14		2	5	43	
West Virginia		4				35	1
North Carolina	1	29				42	
South Carolina	1	3				2	11
Georgia		12				10	4
Florida					3	6	
East South Central	2	60		1	13	85	26
Kentucky		19			2	9	14
Tennessee		32			4	38	1
Alabama	2	6			6	35	11
Mississippi		3		1	1	3	
West South Central	3	23		8	17	184	21
Arkansas	2	3		6	3	15	2
Louisiana	1	4			2	1	
Oklahoma		4		1	2	16	3
Texas		12		1	10	152	16
Mountain	2	5		5	4	82	
Montana						12	
Idaho	2			1		1	
Wyoming						1	
Colorado		2			1	44	
New Mexico		1			2	9	
Arizona					1	8	
Utah		1		4		7	
Nevada		1					
Pacific		23			18	131	2
Washington		2				59	
Oregon		7				6	
California		14			18	66	2
Alaska							
Hawaii						1	

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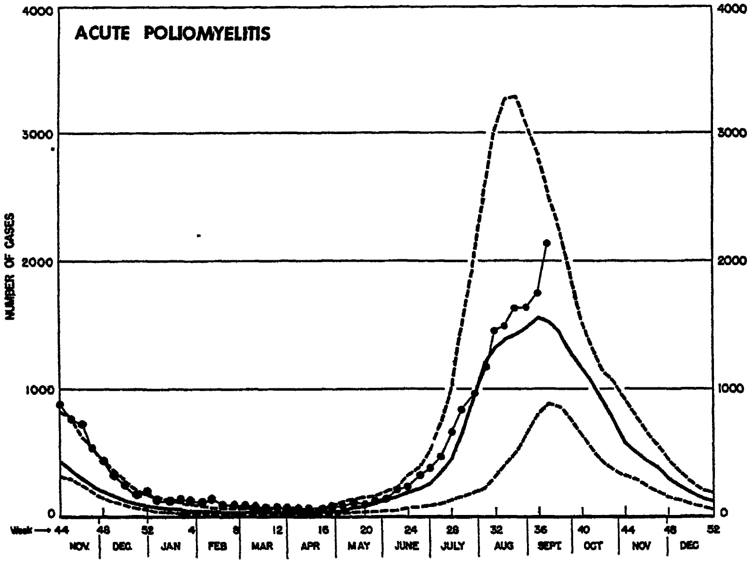
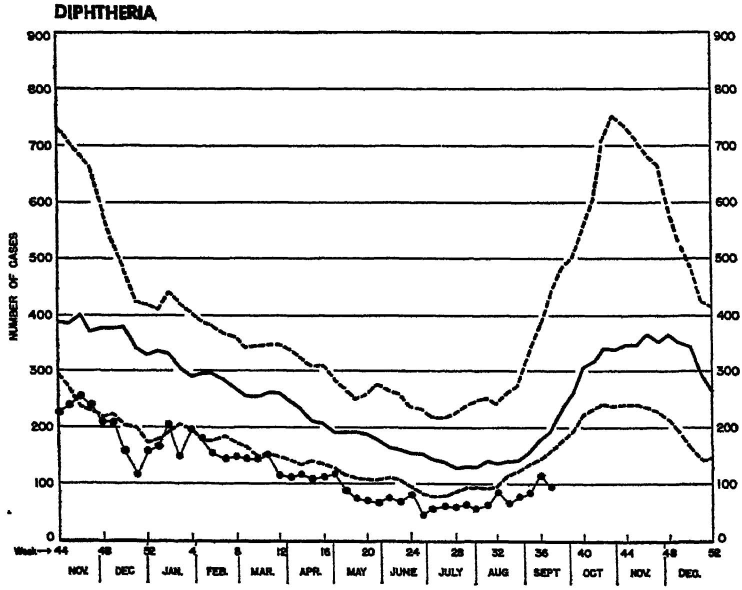
[1] Including cases reported as salmonellosis.
[2] Including cases reported as streptococcal sore throat.

Communicable Disease Charts

All reporting States, November 1949 through September 16, 1950





The upper and lower broken lines represent the highest and lowest figures recorded for the corresponding weeks in the 5 preceding years. The solid line is a median figure for the 5 preceding years. All three lines have been smoothed by a 3-week moving average. The dots represent numbers of cases reported for the weeks of 1950.

FOREIGN REPORTS

CANADA

Reported Cases of Certain Diseases—Week Ended Aug. 26, 1950

Disease	New found-land	Prince Ed-ward Island	Nova Scotia	New Bruns-wick	Que-bec	On-tario	Mani-toba	Sas-katch-ewan	Al-berta	Brit-ish Co-lum-bia	Total
Brucellosis					2			1			3
Chickenpox			14		21	31	8	12	33	24	143
Diphtheria				1	2		1				4
Dysentery, bacillary					13	7	3	1		1	25
German measles			2			26		6	1	6	41
Influenza			26			4	3				33
Measles			8		108	62	3	4	5	19	209
Meningitis, meningococcal				1					1		2
Mumps			11		32	67	4	22	49	14	199
Poliomyelitis			3		7	18	1	11	12	3	55
Scarlet fever				1	12	8	2	2	8	1	34
Tuberculosis (all forms)	14		8	10	74	26	16	14	16		178
Typhoid and paratyphoid fever					5	2			1	1	9
Venereal diseases:											
Gonorrhea	7		8	16	56	60	37	34	55	83	356
Syphilis	4		8	4	61	25	7	14		5	128
Whooping cough	1		10	1	73	66	16	1	6	19	193

CUBA

Reported Cases of Certain Diseases—5 Weeks Ended July 29, 1950

Disease	Pinar del Rio	Habana		Matan-zas	Santa Clara	Cama-guey	Oriente	Total
		Habana City	Total					
Cancer	14		27	18	25	2	23	10
Chickenpox		7	8			1	4	1
Diphtheria		10	14	1				15
Leprosy	5		9				4	18
Malaria							9	9
Measles	1	3	3	2			4	10
Poliomyelitis						1	1	2
Tuberculosis	6		6	21	27	17	19	96
Typhoid fever	4	11	16	16	30	7	30	103
Whooping cough			5				2	7

NORWAY

Reported Cases of Certain Diseases—June 1950

Disease	Cases	Disease	Cases
Diphtheria	8	Poliomyelitis	42
Dysentery	1	Rheumatic fever	96
Encephalitis, infectious	1	Scabies	637
Erysipelas	327	Scarlet fever	136
Gastroenteritis	4,042	Tuberculosis (all forms)	331
Hepatitis, infectious	63	Typhoid fever	1
Impetigo contagiosa	1,452	Venereal diseases:	
Influenza	2,373	Gonorrhea	223
Measles	542	Syphilis	67
Meningitis, meningococcal	9	Other forms	4
Mumps	134	Whooping cough	2,149
Pneumonia (all forms)	2,296		

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

Burma. During the week ended August 26, 1950, 14 cases of cholera, with 7 deaths, were reported, including 6 fatal cases in the port of Toungoo, and 1 case in the port of Kyaukpyu.

India (French). During the week ended August 26, 1950, 58 cases of cholera were reported in Pondicherry.

India (Portuguese). Cholera has been reported in Damao District, as follows: Week ended August 5, 1950, 3 cases; week ended August 12, 14 cases.

Plague

Belgian Congo. During the week ended August 26, 1950, one fatal case of pneumonic plague was reported in Costermansville Province at Kikendi, northeast of Lubero.

Brazil. During July 1950, one case of plague was reported at Inhambupe in Bahia State.

Ecuador. During the period July 1–15, 1950, one case of plague was reported in Loja Province at Pindal, Celica County.

Smallpox

Peru. Four hundred and eighty cases of smallpox were reported in May 1950.

Venezuela. For July 1950, 267 cases of smallpox (alastrim) were reported.

Typhus Fever

Peru. One hundred and thirty cases of typhus fever were reported during May 1950.

Yellow Fever

Brazil. On June 24, 1950, one death from jungle yellow fever was reported at Ipiau in Bahia State.

State and Territorial Health Authorities 49th Annual Conference

Public health officials from all the States and Territories and from the Provinces of Canada will meet October 23–27 at one of the largest gatherings of public health administrators ever held in Washington, according to Dr. Wilton L. Halverson, President of the Association of State and Territorial Health Officers.

The meeting coincides with the 49th annual conference of administrators of State health programs called by Dr. Leonard A. Scheele, Surgeon General of the Public Health Service, and will deal chiefly with the health and medical aspects of civil defense planning. The program will also include two days of scientific sessions, October 24 and 25, at the National Institutes of Health, the Public Health Service's research center at Bethesda, Md.

Speakers on civil defense will include: Dr. Scheele, Dr. Norvin Kiefer, Director of Health Resources of the National Security Resources Board, and Dr. Herman E. Hilleboe, New York State Commissioner of Health. This session will be held Thursday morning, October 26, at the Federal Security building.

Included in the Children's Bureau session Thursday afternoon is a talk on the Mid-Century White House Conference on Children and Youth by Melvin A. Glasser, Executive Director of White House Conference.

Plans for action programs which can be recommended to the States will be formulated by the newly organized Civil Defense Committee of the Association of State and Territorial Health Officers. Members of this committee are: Dr. Wilton L. Halverson, Director of Public Health, California; Dr. Roy L. Cleere, Executive Director, Department of Public Health, Colorado; Dr. Vlado A. Getting, Commissioner of Public Health, Massachusetts; Dr. N. H. Dyer, State Director of Health, West Virginia; Dr. L. E. Burney, State Health Commissioner, Indiana; Dr. R. H. Hutcheson, Commissioner of Public Health, Tennessee; Dr. F. C. Beelman, Executive Officer and Secretary, Board of Health, Kansas.

Military Surgeons to Hold 1950 Convention

The Association of the Military Surgeons of the United States will hold its 1950 convention November 9–11 at the Hotel Statler, New York City.

Appropriate to the times, the programs will include forum lectures on civil defense, the defense role of the physician, aviation medicine, rehabilitation, military medicine, surgery, sanitation, and discussions on the use of the newest therapeutic and prophylactic agents in emergency conditions.

The convention has been organized to provide section meetings for dental, nursing, veterinary, and other specialty groups. Several of the sessions will be directed to the problems of the medical reserve.

The forum lecture on Civil Defense Planning will be given by Dr. Norvin C. Kiefer, Director of the Health Resources Division, National Security Resources Board.

Further information may be obtained from Col. James M. Phalen, Armed Forces Institute of Pathology, Washington 25, D. C.

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

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FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
G. St. J. Perrott, Chief of Division

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United Nations Day—October 24

We hope that the observance of United Nations Day on Tuesday, October 24, this year will be the most dramatic demonstration yet witnessed of the support of the free peoples of the world for the United Nations as an instrument for keeping the peace and advancing human welfare.

The authority of the United Nations—and the will of the free peoples which it expresses—has been challenged openly by the unprovoked aggression by the North Korean Communist forces against the Republic of South Korea. The United Nations has met this direct challenge with a decisiveness that has been acclaimed by the overwhelming majority of the peoples of the world. It is fitting, therefore, that in this period of crisis the people of the United States join the people in every corner of the globe in rededicating themselves to the mandate for peace and progress which became world law when the United Nations charter came into force 5 years ago.

The charter states clearly the goals which motivated the forming of the United Nations . . . to save succeeding generations from the scourge of war . . . to reaffirm faith in fundamental human rights . . . to promote social progress. Achieving these goals will not be easy. But, as one great American statesman has declared, the fulfillment of humanity's highest aspirations and the very survival of our civilization may well depend upon the success of the United Nations.

Though still a young organization, the United Nations can stand upon a solid record of dynamic accomplishments. It has succeeded in halting shooting wars in Palestine, Indonesia, and Kashmir. It has brought new hope and a new start to over a million refugees and other innocent victims of war. It has spearheaded a world attack on famine and hunger. In cooperation with our own Point Four program, it has embarked on a down-to-earth program of technical assistance to help the people of the underdeveloped areas.

In the Public Health Service, of course, we have been especially interested in the work of the World Health Organization in which we have participated since the formation of that specialized agency of the United Nations in 1948. The World Health Organization is working on a day-by-day basis to guarantee better health for all people. It is conducting a world-wide offensive not only against physical illness but against the diseases of the mind and the social maladjustments that breed war. Indeed, as the constitution of the WHO affirms, the health of all peoples is fundamental to the attainment of peace and security. Already, the WHO has conducted specific aid projects in over 50 countries and territories, stopped epidemics of cholera, and successfully fought malaria in many regions. Its work is just beginning, but it has a bright future.

It has been truly said that the peoples of the world are the United Nations and it will live only as we as individuals give it our support. United Nations Day affords an opportunity to demonstrate this support. The Public Health Service welcomes this opportunity to pledge again full support of the United Nations and its ideals, as well as continued close cooperation with the World Health Organization.

LEONARD A. SCHEELE, M. D.,
Surgeon General, Public Health Service.

Saline Solution in Treatment of Burn Shock

The Surgery Study Section of the National Institutes of Health has recommended to the Surgeon General of the Public Health Service that the use of oral saline solution be adopted as standard procedure in the treatment of shock due to burns and other serious injuries in the event of large-scale civilian catastrophe.

The recommendations followed action taken at the January 1950 meeting of the Surgery Study Section, when such treatment was approved in principle. Dr. Carl A. Moyer, a member of the Study Section, was designated at that time to prepare a memorandum suitable for submission to Dr. Norvin A. Kiefer, Director, Health Resources Division (now Health Resources Office), National Security Resources Board.

Dr. Moyer's memorandum, which was submitted to Dr. Kiefer, February 15, 1950, reads as follows:

"Since the publication of the experimental work of Dr. Rosenthal, Dr. Coller, et al., orally administered salt solutions have been employed in the treatment of burns at the University of Michigan Hospital, Ann Arbor, Mich.; at the Wayne County General Hospital, Eloise, Mich.; and at Parkland Hospital, Dallas, Tex. Personal clinical experience, in the above-named hospitals, has convinced me that the orally administered salt solutions are valuable adjunctive agents in the treatment of shock incident to burns, fractures, peritonitis, and acute anaphylactoid reactions. Certain factors are important in governing the effectiveness of the oral administration of salt solutions. They are as follows:

"1. The composition of the salt solution: The most palatable salt solution is made by dissolving 3 to 4 grams of sodium chloride and 2 to 3 grams of sodium citrate in each liter of water. If sodium citrate is not available, ordinary baking soda may be substituted for it.

"2. The concentration of salt should not be in excess of 140 milliequivalents of sodium per liter. If the concentration is above this, vomiting and diarrhea become important complicating factors.

"3. Whenever profound peripheral circulatory collapse is present, the intravenous route of administration must be used until peripheral blood flow has been reestablished. The salt solutions that we have found most satisfactory for this purpose are Hartmann's solution (Lactate-Ringer's solution) or plasma. In addition to the salt solution or plasma intravenously, whole blood is given concurrently whenever peripheral circulatory collapse exists. This materially implements the effectiveness of salt solutions.

"The slightly hypotonic salt solution is the only drinking fluid permitted the injured individual until the edema of the injured parts begins to subside. Certain exceptions to this rule have to be made during the hot weather of summer when it is sometimes necessary to permit the partaking of some non-salty water.

"As much as 10 liters of the hypotonic salt solution have been drunk in the 24-hour period by adults who have been severely burned. Since salt solution has been substituted for water, as a drinkable fluid, no burned person who has lived for longer than 3 hours after being admitted to the hospital has suffered from anuria. The 'early toxemia phase' of the burns has also failed to appear and the osmotic concentration of the plasma electrolytes has been well maintained.

"We feel that much more clinical observation and actual experimental work should be undertaken regarding the effectiveness of the basic principles of the supportive therapy of burns that have been so beautifully demonstrated by Dr. Rosenthal. It is obvious that the adoption of a more active program of investigation into the relative effectiveness of simple measures to combat shock would be of extreme importance to the Armed Forces and to the civilian population in the event of another war."

Because of the sharpened national emergency that developed during the summer of 1950, the Surgery Study Section, in approving Dr. Moyer's memorandum at its meeting on September 16, changed the last paragraph to read:

"While further clinical research concerning the effectiveness of oral salt solution in the treatment of burns and other injuries is certainly in order, there is already sufficient evidence to suggest that this form of treatment should be used in any large-scale disaster involving the civilian population."

The Surgery Study Section letter to the Surgeon General, dated September 16, 1950, reads as follows:

"It is my understanding that one of the functions of the Study Sections is to offer advice to the Surgeon General in fields of medicine lying within the special competence of the Study Section members. At the January 1950 meeting of the Surgery Study Section, there was considerable discussion concerning the use of oral saline solutions in the treatment of burns and other serious injuries. It was the consensus of the Section at that time that, on the basis of the animal work which had been done by Dr. Rosenthal of the National Institutes of Health, and the clinical work which had been done by Dr. Carl A. Moyer, by the undersigned, and by others, the efficacy of such treatment had been definitely demonstrated and that, while there is need to stimulate additional research in this field, our present knowledge is sound enough so that action can be taken on this basis. Dr. Moyer was designated to draft a short memorandum expressing our point of view on this subject. Such a memorandum was prepared and furnished to Dr. Norvin C. Kiefer, Director, Health Resources Division, National Security Resources Board, on February 15, 1950. A copy of Dr. Moyer's memorandum is attached.

"In view of the more acute national emergency that has developed since Dr. Moyer wrote this memorandum, the Study Section, at its meeting on September 16, 1950, voted to recommend that the principles of treatment outlined in his memorandum be adopted for widespread use in any large-scale disaster involving the civilian population. Because of the present emergency situation, we have modified the last paragraph of Dr. Moyer's memorandum to read, 'While further clinical research concerning the effectiveness of oral salt solution in the treatment of burns and other injuries is certainly in order, there is already sufficient evidence to suggest that this form of treatment should be used in any large-scale disaster involving the civilian population.'

"You are at liberty to transmit this recommendation of the Surgery Study Section to the National Security Resources Board or to other proper agencies, and, if you see fit, to publish it. We feel strongly that it is important for the medical profession of the country and for those planning for the handling of potential disasters to be informed of the value of this simple and easily carried out form of treatment."

The letter was signed by Frederick A. Coller, M. D., professor of surgery, University of Michigan, Chairman of the Surgery Study Section. Members of the Study Section, in addition to Dr. Coller, are: Dr. Claude S. Beck, professor of neurosurgery, Western Reserve University; Dr. Loren R. Chandler, dean, Stanford University Medical School; Dr. Lester R. Dragstedt, professor of surgery, University of Chicago; Dr. Daniel C. Elkin, professor of surgery, Emory University; Dr. Carl A. Moyer, dean and professor of surgery, Southwestern Medical School, University of Texas; Dr. Harris B. Shumacker, Jr., professor of surgery, Indiana University Medical Center; Dr. Owen H. Wangensteen, professor of surgery, University of Minnesota; Dr. Allen O. Whipple, clinical director, Memorial Hospital, New York City; Dr. H. L. Skinner, chief of surgery, Staten Island Marine Hospital; Dr. Henry Beecher, professor of anesthesiology, Harvard University Medical School; Dr. J. Gordon Lee, chief of surgery, Mount Alto Hospital, Washington, D. C.; Dr. Howard R. Lawrence, chief of surgery, Francis E. Warren Air Force Base Hospital, Wyoming; and Dr. G. Halsey Hunt, chief, Division of Hospitals, Public Health Service.

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60: 373–381; 401–419 (1945). Am. J. Physiol. **149:** 449–464 (1947). Arch. Surg. **51:** 244–252 (1945).

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(*11*) Reynolds, M.: Cardiovascular effects of large volumes of isotonic saline infused intravenously into dogs following severe hemorrhage. Am. J. Physiol. **158:** 418–428 (1949).

NOTE: This does not represent a complete bibliography.

Tularemia

Geographical Distribution of "Deerfly Fever" and the Biting Fly, *Chrysops discalis* Williston

By William L. Jellison*

"Deerfly fever" was described by Pearse (*1*) in 1911 as a disease entity of man in Utah where it had been recognized by physicians for several years. It is one of the many epidemiological manifestations of tularemia, an infectious bacterial disease of man and other animals, named and described by Francis (*2*) in 1920. While most cases of "deerfly fever" would be classed clinically as an ulceroglandular type of tularemia, epidemiologically, the cases are distinct in that (a) the initial lesion at the site of infection is usually on an exposed part of the body, i. e., hands, arms, face, or neck; (b) most of the cases occur in June, July, and August; (c) the disease has a rather restricted geographical distribution in contrast to tularemia in general, as shown in this study; and (d) the patient often observes being bitten by a deerfly and later recalls the incident when an initial lesion or ulcer develops at the site.

The successful experimental studies by Francis and Mayne (*3*) on the transmission of tularemia by deerflies were undertaken because, as they state, "popular belief had connected the occurrence of human cases of tularemia with the bites of *Chrysops discalis*." This species was abundant in areas where human cases were common and was known to bite man. Although it proved to be an efficient experimental vector, Francis and Mayne did not find natural infection nor did they observe the deerflies feeding on wild rabbits, a presumed source of infection in nature.

A few cases of tularemia from deerfly bites are reported nearly every year in the West. At least one epidemic occurred among Civilian Conservation Corps workers near Locomotive Springs, north of Great Salt Lake, Utah, in 1935, as reported by Hillman and Morgan (*4*).

Typical cases of "deerfly fever" appear to be confined to certain Western States and Canadian provinces in contrast to other epidemiological forms of tularemia which are widely distributed throughout the United States, and to a lesser extent in Canada. It is especially noticeable that few or no cases of "deerfly fever" are reported in States of high tularemia incidence east of the Mississippi River. This case distribution suggests a study of and comparison with the distribution of the deerfly, *Chrysops discalis* Williston, one of the accepted vectors of the disease.

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*From the Microbiological Institute of the National Institutes of Health, Public Health Service (Rocky Mountain Laboratory, Hamilton, Mont.).

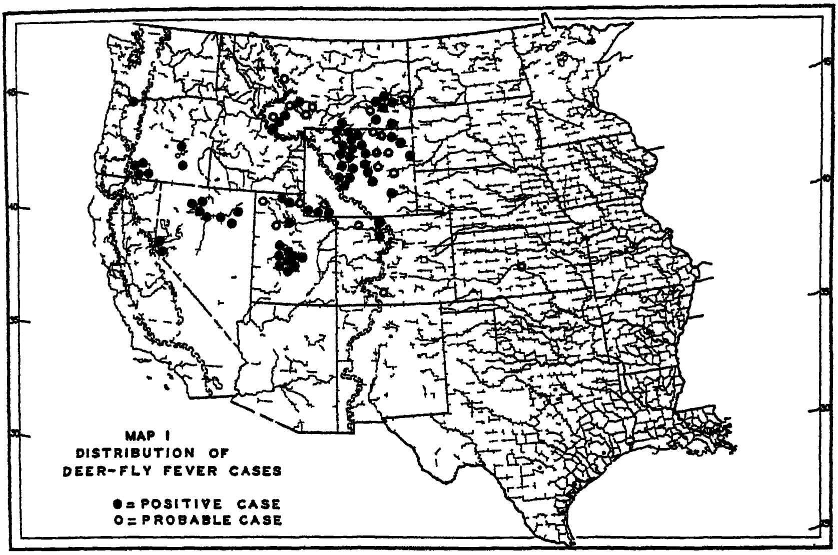
Distribution of Cases

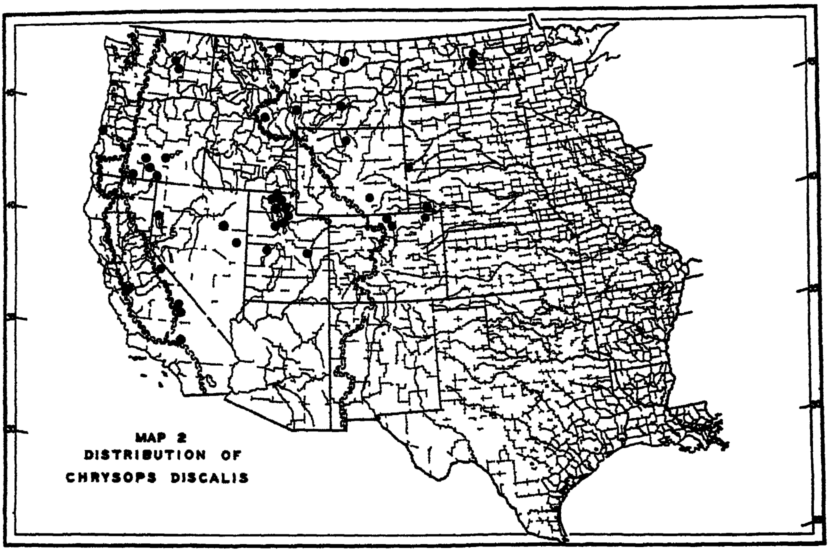
Data on the distribution of tularemia cases designated as "deerfly fever" by the reporting physician or attributed to the bites of flies have been obtained from Dr. Edward Francis (Retired) of the Public Health Service, who has supplied all records available from his files including the early cases he studied in Utah. The late Dr. R. R. Parker had made available all records and physicians' reports, published and unpublished, in the files of the Rocky Mountain Laboratory. The published literature on tularemia has been reviewed for additional cases. All cases for which the diagnosis appears positive and for which the geographical source of the infection can be located with reasonable certainty have been consolidated on map 1, Distribution of "Deerfly Fever" cases. These cases are indicated by solid black circles. Additional cases, which were reported as probably caused by deerfly bites, are indicated by hollow circles on the same map. All the cases are listed in tables 1 and 2. In only two instances, one case in Kansas and one case in southern Colorado, do the "probable cases" appear to be beyond the general range of the positive cases.

Distribution of *Chrysops discalis*

Dr. C. B. Philip, of the Rocky Mountain Laboratory, an authority on the Tabanidae, supplied the writer with records of specimens in his own collection and records of identification of this species in the collections of many institutions and entomologists. Records were received from the following: the United States National Museum through Dr. Alan Stone; the California Academy of Sciences through Edward F. Ross; Montana State College through Dr. H. B. Mills; Utah Agricultural College through Dr. George F. Knowlton; the Livestock Insect Laboratory, Kamloops, British Columbia, through George P. Holland; and from the University of British Columbia through G. J. Spencer. A few Oregon collections are recorded in a recent publication by Gjullin and Mote (*5*).

All of these collection records are consolidated on map 2 and in table 3 insofar as the places mentioned could be located. The distribution of *C. discalis* in Canada is not mapped, but it is recorded for Maple Creek in southeastern Saskatchewan and from Baldur Lake in southern Manitoba by Cameron (*6*). Its presence west of the Rockies in British Columbia is mentioned by Hearle (*7*) without giving specific localities, although he states it is especially common in the dry belt of British Columbia. Specific locality records of collections in British Columbia are listed here.





The species is known to occur in the Canadian Provinces of British Columbia, Alberta, Saskatchewan, and Manitoba, and in the States of Oregon, Montana, North Dakota, South Dakota, Washington, Idaho, Wyoming, California, Nevada, Utah, Colorado, and Nebraska. It is especially abundant in the vicinity of alkaline lakes in prairie regions.

Three cases of tularemia from Canada caused by deerfly bites are recorded by Jenkins (*8*) without details as to localities. The Rocky

Table 1. *Definite cases of "deerfly fever"*

Case No.	Initials	Sex	Age	Date onset	Locality	Reporting physician	Source of data
1	C. E. B	M	34	7-5-24	Idaho Falls, Idaho	D. H. Junkins	E. Francis.
2	R. W. P	M	52	8-23	do	do	Do.
3	A. B	M	44	7-6-23	Cowley, Wyo	E. W. Croft	Do.
4	P. Q	M		8-15-25	Klamath Falls, Oreg	E. Dietsche	Do.
5	J. H. S	M		7-1-25	do	do	Do.
6	S. S	M		6-29-25	do	do	Do.
7	W. S	M	17	7-26-16	Basin, Wyo	C. E. Harris	Do.
8	J. I. B	M		1915	do	do	Do.
9	Mrs. H	F		7-26-16	do	do	Do.
10	E. L	M		6-27-25	do	do	Do.
11	L. C. W	M		8-16	do	do	Do.
12	O. O	M	41	7-3-16	Nevada	A. J. Hand	Do.
13	D. P	M	35	7-30-26		W. H. Hood	Do.
14	R. C. E	M	38	7-16	Thermopolis, Wyo	C. D. Carter	Do.
15	W. H	M	13	7-26	Colorado	G. W. Corey	Do.
16	M. G			8-19-26	Basin, Wyo	C. E. Harris	Do.
17	W. W	M			Miles City, Mont	Andrus and Garberson	Do.
18	A. L	M	30	9-16-26	Wyoming	J. D. Barrett	Do.
19	F. W	F			Portland, Oreg	J. R. Coffee	Do.
20	E. E. B	M		7-14-28	Battle Mountain, Nev	U. S. Navy Hospital, Mare Island	Do.
21	D. J	M	28	7-28-32	Salt Lake City, Utah	O. A. Oglivie	Do.
22		M	41	7-26	Simpson, Nev		Geiger & Meyer.
23		M	39	7-27	Winnemucca, Nev		Do.
24		M	17	7-28	do		Do.
25		M	50	7-28	Battle Mountain, Nev		Do.
26		F	39	7-28	Ruby Valley, Nev		Do.
27		M	44	6-15-26	Minnesota		T. B. Magath & W. M. Yater.
28-57		M			Locomotive Springs, Utah		Hillman & Morgan.
58	R. S	M	52	7-23-19	Delta, Utah	H. L. Charles	E. Francis (1921).
59	W. E. C	M	50	6-16-20	Holden, Utah	J. E. Fuhrer	Do.
60	J. T. G	M	48	6-27-20	Fillmore, Utah	do	Do.
61	M. S	M	16	6-23-20	Holden, Utah	do	Do.
62	Mrs. M	F	41	6-16-20	do	W. B. Hamilton	Do.
63	C. F.	M	30	7-21-20	Fillmore, Utah	J. E. Fuhrer	Do.
64	J	F	7	9-9-20	Hinkley, Utah	H. L. Charles	Do.
65	T. F	F			Salt Lake City, Utah	T. A. Flood	Rocky Mt. Lab.
66	D. D.	M	14	8-15-35	Oregon	California State Health Department	
67	L. H	M	29	7- 6-35	Newcastle, Wyo	Horton & Horton	Rocky Mt. Lab.
68	J. J	M	35	9- 1-40	Miles City, Mont	M. D. Winter	Do.
69	J. L. M	M			do	do	Do.
70		M	35	7——28	Sparks, Nev		Geiger & Meyer.
71					Kansas		Brown, Lattimore & Hoffman.
72	O. S	M	45	7-18-36	Kremmling, Colo	R. W. Danielson	Rocky Mt. Lab.
73	J. D. C	M	46	8- 4-43	Walden, Colo	J. Rowlett	Do.
74	C. J	M	16	6-20-26	Trident, Mont	A. R. Foss	Do.
75	I. B	M	30	8- 4-29	N. E. Dillon, Mont	E. G. Free	Do
76	J. B	M	15		Grant, Mont	do	Do.

78	G. L. W	M	32	8-12-41	N. Dillon, Mont	H. A. Stanchfield	Do.
79	V. N	M	25	1942	Forsyth, Mont	M. D. Winter	Do.
80	L. B	F	36	1944	Southeastern Mont	D. S. Leng	Do.
81	W. L	M	41	7——43	Sheffield, Mont	R. R. Randall	Do.
82	J. J	M	50	9-22-40	Garland, Mont	A. R. Varca	Do.
83	R. P			1919	Carlin, Nev	C. E. Secor	Do.
84	L. M	M	25	1928	Ruby Valley, Nev	do	Do.
85	F. R	M	40	1943	Lowen, Oreg	J. W. Weare	Do.
86	C. H	M	17	9- 3-44	N. Klamath Falls, Oreg	G. A. Massey	Do.
87	A. H	M	26	1935	Corrine, Utah	R. M. Fauch	Do.
88	R. K. S	M		1919	Great Salt Lake, Utah	Stewart	Do.
89	K. M	M	14	1944	Delta, Utah	Utah State Board Health	Do.
90	J. L	M	56	8- 6-45	Ferron, Utah	B. Turman	Do.
91	J. L. W	M	56	8——25	Lovell, Wyo	C. E. Harris	Do.
92	J. S. W	M	70	7- 2-33	Pavillion, Wyo	L. H. Wilmoth	Do.
93	W. M	M	45	1935	S. W. Rock Springs, Wyo	E. S. Lauzer	Do.
94	W. D. L	M	26	6-12-36	Lander, Wyo	P. R. Holtz	Do.
95	J. T	M	9	6-10-40	N. Lander, Wyo	do	Do.
96	I. M	M	36	7-13-42	Basin, Wyo	S. L. Myre	Do.
97	O. B	M	40	7-15-42	Hyattville, Wyo	C. Raffl	Do.
98	R. G	F	40	7-15-42	Powell, Wyo	P. J. Clark	Do.
99	J. S	M	38	8- 1-42	Lander, Wyo	F. E. Rogers	Do.
100	A. J. W	M	62	8-15-42	W. Basin, Mont	C. Raffl	Do.
101	M. B	M	19	8-15-42	Fremont Co., Wyoming	F. E. Rogers	Do.
102	R. D. K	M	49	5- 2-43	Moorcroft, Wyo	D. S. Lenz	Do.
103	L. B	M	35	6- 2-43	Gillette, Wyo	do	Do.
104	B. W	F	55	6-10-43	Laramie, Wyo	R. M. Leake	Do.
105	H. R	M	50	7——43	Hyattville, Wyo	K. A. Avery	Do.
106	H. C	M	74	7- 5-43	Recluse, Wyo	D. S. Lenz	Do.
107	C. C	M	6	7-15-43	Deaver, Wyo	W. W. Horsley	Do.
108	C. T	M	40	5-24-44	Fremont Co., Wyoming	B. Gitlitz	Do.
109	L. M	M		6-17-44	McKinnan, Wyo	K. E. Kreuger	Do.
110	A. J. M	M	72	7- 1-44	Fremont Co., Wyoming	F. E. Rogers	Do.
111	C. T. E	M	55	7-10-44	do	do	Do.
112	J. T	M	13	7-20-44	Big Horn Co., Wyoming	S. L. Myre	Do.
113	J. O	M	14	8-15-44	do	do	Do.
114	R. P	M	55	7-21-45	Hot Springs Co., Wyoming	K. G. Avery	Do.
115	J. A. B	M		7-25-45	Natrona Co., Wyoming	H. E. Stuckenhoff	Do.
116	F. P	M	71	8- 1-45	Fremont Co., Wyoming	W. F. Smith	Do.
117	J. H	M	16	8-17-45	Natrona Co., Wyoming	H. E. Stuckenhoff	Do.
118	O. S	M	53	9- 1-45	Albany Co., Wyoming	J. F. Hill	Do.
119	A. W	F		1941	Clearmont, Wyo	C. L. Rogers	Do.
120	J. S	F	60	8-18-43	Deaver, Wyo	W. W. Horsley	Do.
121	S	M	17	7-17-38	Cardston, Alberta	H. L. Seamans	Do.
122	E. C. R	M	37		Banff, Alberta	H. McKenzie	Do.
123	M. B	F	22	7-16-46	Lake Co., Idaho	Spencer & Rich	Do.
124	B. S	M	29	6-29-46	Delta, Utah	E. L. Skidmore	Do.
125	R. O	M	15	9-19-46	Salt Lake City, Utah	R. O. Johnson	Do.
126	M. T. C		36	8-10-46	Lyman, Wyo	J. S. Hellewell	Do.
127	E. L	M	20	7-21-46	Casper, Wyo	H. L. Harvey	Do.

Table 2. *Probable cases of "deerfly fever"*

Case No.	Initials	Sex	Age	Date onset	Locality	Reporting physician	Source of data
128	I. M. H	F	57	7-17-37	Montevista, Colo	J. J. Warnig	Rocky Mt. Lab.
129	R. F. K	M	2	8-21-43	Craig, Colo	J. H. Dickason	Do.
130	H. J	----	----	8-19-44	Oreana, Idaho	C. T. Horton	Do.
131	A. L	M	42	7-7-31	Wichita, Kans	Rick & Jaeger	Do.
132	G. F	M	26	7-20-35	Forsyth, Mont	J. V. Neville	Do.
133	R. G. H	M	28	8-15-39	Whitehall, Mont	A. R. Sievers	Do.
134	W. M	M	54	1939	Beaverhead Co., Montana	H. A. Stanchfield	Do.
135	E. K	F	65	7-1-40	Wilsall, Mont	W. E. Harris	Do.
136	E. M	M	17	8-29-40	Bozeman, Mont	A. D. Brewer	Do.
137	L. M	M	56	4-17-41	Forsyth, Mont	R. A. Elliot	Do.
138	B. M	M	60	----	Vananda, Mont	M. D. Winter	Do.
139	L. L. B	F	50	8-28-42	Miles City, Mont	W. Winters	Do.
140	H. L	M	56	----	Billings, Mont	W. V. Weldman	Do.
141	M. B	F	58	8-6-45	Diamond, Oreg	J. H. Weare	Do.
142	C. C	F	38	5-40	Sheridan, Wyo	C. L. Rogers	Do.
143	A. L	M	30	9-16-26	Ralston, Wyo	J. D. Barrett	Do.
144	G. L	M	20	7-1-35	Worland, Wyo	L. S. Anderson	Do.
145	A. E. S	F	42	8-1-40	Basin, Wyo	A. A. Engleman	Do.
146	J. W	F	38	5-41	Savageton, Wyo	A. G. Hoadley	Do.
147	D. A	----	----	7-41	Kaycee, Wyo	J. J. McGill	Do.
148	D. S	M	70	7-41	Midway, Wyo	do	Do.
149	C. B	F	46	7-15-41	Douglas, Wyo	F. C. Shaffer	Do.
150	T. J	M	27	7-20-41	Green River, Wyo	R. C. Stratton	Do.
151	R. W	M	17	7-25-44	Big Horn Co., Wyoming	K. G. Avery	Do.
152	O. F	M	39	7-3-49	Richland Co., Montana	R. D. Benson	Do.
153	D. L	M	9	----	Lewis & Clark Co., Montana	C. M. Mears	Do.
154	R. L	F	22	6-4-46	Grantsville, Utah	J. Mayo	Do.
155	E. R	F	23	7-46	Randolph, Utah	J. P. Burgess	Do.
156	V. W	M	36	7-5-49	Box Elder Co., Utah	G. C. Ficklin	Do.
157	D. C	F	20	6-25-49	Box Elder Co., Utah	H. H. Pearse	Do.
158	A. B	M	35	7-6-46	Powell, Wyo	K. G. Avery	Do.

Table 3. *Collection records of* Chrysops discalis *Williston*

State or province	Locality	County	Date	Source of data*
California	Bridgeport	Mono	June	USNM.
	Crescent City	Del Norte	May	CAS.
	Grand Junction		June	CAS.
	Lone Pine	Inyo	May, June	CAS & Philip.
	Los Banos	Merced	May	CAS.
	Mojave Desert			Hine.
	Olancha	Inyo	May, June, July	USNM.
Colorado	Sterling	Logan	June	USNM.
	Fort Collins	Larimer	June	Philip.
Montana		Beaverhead		Philip.
	Billings	Yellowstone	July	MSC.
		Glacier	June	CAS.
	Gallatin Mountains	Gallatin	July	Philip.
		Phillips		Philip.
	Great Falls	Cascade	July	MSC.
	Sun River Project		July	Philip.
Nebraska	Haigler	Cheyenne	July	Philip.
North Dakota	Devils Lake	Ramsey	June, July	USNM.
Nevada	Hazen	Churchill		Francis.
	Pyramid Lake	Washoe		Hine.
	Ruby Valley	Elko	August	Philip.
Oregon	Abert Lake	Lake	August	Philip.
	Klamath Falls	Klamath	July	USNM.
	Paisley	Lake	July	USNM & Philip.
	Rest Lake	Lake	August	Philip.
	Summer Lake	Lake	July	USNM & Philip.
South Dakota	Silver Lake		August	Philip.
	Tulare	Spink		Philip.
Utah	Bay River Bay		August	Philip.
	Blue Lake	Millard		Francis.
	Brigham	Box Elder	June, July, August	USNM.
	Corinne	Box Elder	July, August	USNM & Philip.
	Delta	Millard	July	USNM.
	East Promontory		August	Philip.
	Farmington	Davis	July	USNM & Philip.
	Garfield	Salt Lake	July	USNM.
	Great Salt Lake		May	CAS.
	Honeyville	Cache	May	Philip.
	Hooper	Weber	June, July, September.	USNM.
	Lampe		August	Philip.
	Mouth of Bear River	Box Elder	July	USNM.
	Penrose	Box Elder	June	USNM & Philip.
	Promonotory Point	Box Elder	July	USNM.
	Saltair	Salt Lake	June	USNM & CAS.
	Timpie		August	Philip.
	Trenton	Box Elder	June	USNM.
	Utah Public Shooting Grounds.		May	Philip.
Washington	Blue Lake	Grant	June	Philip.
	Stratford	Grant	September	USNM.
	Soap Lake	Grant	July	Philip.
Wyoming	Basin	Big Horn	August	USNM.
Alberta	Medicine Hat		July	Philip.
British Columbia	Big Bear		July	UBC.
	Chilcotin		June, July, August	UBC.
	Kamloops		June, July, August	UBC.
	Nicola		July	UBC.
	Moute Creek		July	Philip.
Manitoba	Baldur Lake		June	Cameron (1926).
Saskatchewan	Maple Creek		June	Cameron (1926).

*Legend for abbreviations:
USNM=U. S. National Museum.
CAS=California Academy of Sciences.
MSC=Montana State College.
UBC=University of British Columbia.

Mountain Laboratory has records of two Canadian cases, one from Banff and one from Cardston, Alberta, that were attributed to deerfly bites. The Banff locality, which is in the mountains, is not typical territory for *C. discalis*, but it is not far from the plains area where the species would more customarily occur. However, the species has been collected in the mountains.

Discussion

Probably rarely, if ever, has the individual fly that caused a case of "deerfly fever" in nature been captured and identified by an entomologist. However, the strong circumstantial evidence, supported by successful experimental transmission, Francis and Mayne (*3*), that *C. discalis* is a vector in nature must be accepted. The writer sees no reason to question this conclusion, but the question has been raised as to whether or not *C. discalis* is the only species of the biting fly family Tabanidae that is an important natural vector of the disease.

By comparison of maps 1 and 2, it is evident that the great majority of all cases so far diagnosed as "deerfly fever" fall within the range of the one species. Most areas of the United States have one or more species of deerfly that feed avidly on man, and in some places they are reported as extremely annoying. Philip (*9*) recognizes 68 species and 12 subspecies of the genus *Chrysops* from North America north of Mexico. It is reasonable to assume that many of these species, like *C. discalis*, feed on rabbits and other small mammals as well as on man. Tularemia and its important animal reservoirs, rabbits and rodents, are likewise widely distributed in the United States. Jellison and Parker (*10*) have presented evidence that rabbits, especially cottontails, *Sylvilagus* spp., and to a lesser degree jackrabbits, *Lepus* spp., are the most important of these reservoirs.

The total tularemia case incidence by States has been given by Francis (*11*, *12*). Of the 14,002 cases recorded up to 1942, only 1,007 cases, or 7.2 percent of the total, were reported in the six States, Montana, Oregon, Wyoming, Nevada, Utah, and Colorado, that have reported 100 percent of the "deerfly fever" cases.

"Deerfly fever" case distribution, then, does not correspond with the distribution of deerflies in general or with the distribution of the infectious agent, *P. tularensis*, or with the distribution of any one group of mammalian reservoirs of the disease.

This distribution relationship between "deerfly fever" cases and one species of deerfly suggests that there is some factor which makes *C. discalis* an especially efficient vector of the disease and that this factor is lacking in other species of *Chrysops* or *Tabanus*. This factor may be a special predilection of the species for feeding on rabbits and rodents, the principal mammalian reservoirs of tularemia.

Summary

The records of human cases of "deerfly fever," an epidemiological type of tularemia in man in North America, are summarized and localities plotted on a map. The distribution of these cases in a few Western States does not correspond with the distribution of deerflies in general, with the distribution of the infectious agent, nor with the known distribution of any of its important mammalian reservoirs. This geographical distribution does roughly correspond with the distribution of the deerfly species, *Chrysops discalis*, which has been incriminated as the vector in specific localities.

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Detection of Diabetes in a Nutrition Survey

—A Study of 550 persons in Ottawa County, Michigan—

By ELBERT C. TABOR, M.S., and KEITH H. FRANKHAUSER, M.D.*

Numerous surveys to determine the prevalence of undiagnosed diabetes mellitus in a variety of population groups have been conducted in recent years (*1–8*). These surveys had as their sole objective the detection of diabetes. This paper reports the results of a diabetes detection study carried out in connection with a cooperative nutritional study conducted in 1947–48 by a Nutrition Unit of the Public Health Service (*9*) and the Ottawa County Health Department. It was recognized that, strictly speaking, diabetes does not belong within the scope of activities of the nutrition unit. However, since a large number of subjects were available for study, it was felt that this opportunity for diabetes screening should not be overlooked. The investigation was set up with these objectives in mind: (a) to demonstrate the practicability and value of obtaining more than one type of information from subjects participating in a routine nutritional or health appraisal study, and (b) to discover individuals having undiagnosed diabetes.

Study Procedure

Subjects

One thousand Ottawa County families were invited to participate in the nutrition survey. Families were selected so as to comprise an accurate cross section of the population of Ottawa County. Clinics were scheduled in various sections of the county, and the families were invited to attend at a convenient time.

Since the nutrition clinic procedure was organized for nutritional appraisal, no effort was made to obtain information from the subjects relative to their diabetic status; however, information on their dietary histories disclosed some known cases of diabetes. Such information was obtained later from subjects subsequently selected for the diabetic study.

It was decided in the planning of the nutrition survey that blood glucose determinations would be done on subjects 40 years of age and over, since it is generally recognized that diabetes mellitus is more prevalent in this age group. Furthermore, sufficient personnel were not available to include all age groups in the diabetic study.

Upon completion of the nutrition survey the results of blood glucose determinations were studied, and it was decided that follow-up studies should be done on those subjects having a nonfasting capillary glucose of 150 mg. per 100 ml. of blood and over. (Several subjects having a glucose level of 140–150 mg. per 100 ml. of blood 3 hours after the last meal were also included.)

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Follow-up

Subjects chosen for participation in the follow-up were informed by letter that their blood glucose level was high at the time they attended the nutrition clinic. This condition in itself did not signify diabetes mellitus, but it indicated that they should be tested further either to eliminate or confirm the possibility of diabetes mellitus. These persons were asked to inform the health department of their willingness to participate in further studies. Each person replying favorably received a home visit by a public health nurse, who discussed and outlined the projected investigation. The nurse also visited the persons who had either replied negatively or not at all to the invitation to participate.

Clinics were scheduled between 8 and 10 a.m. for the collection of fasting blood and urine samples. From the results obtained on the fasting blood and urine samples, the subjects were classified as diabetics, nondiabetics, or questionable.

The questionable or borderline cases, those who had fasting glucose levels of 120–150 mg. per 100 ml. of blood or showed glycosuria, or both, were asked to take a glucose tolerance test.

Diagnostic Criteria

At present there seems to be some degree of variability in the standards used in the diagnosis of diabetes mellitus. Most authorities agree that a fasting glucose level below 120 mg. per 100 ml. of blood and no evidence of glycosuria in a fasting urine sample would indicate the individual to be a nondiabetic. On the other hand, a fasting glucose level of 140 mg. or more per 100 ml. of blood with glycosuria in a fasting-urine sample is sufficient evidence to indicate that diabetes mellitus exists in that individual. In setting up our diagnostic criteria the above facts governed, but with some variations. Our criteria for diagnosing diabetes mellitus were as follows:

1. A subject showing a fasting glucose of less than 120 mg. per 100 ml. of blood and no fasting glycosuria was classified as nondiabetic.
2. A subject showing a fasting glucose of over 150 mg. per 100 ml. of blood and positive glycosuria was classified as diabetic.
3. Subjects having a fasting glucose of 120–150 mg. per 100 ml. of blood and/or glycosuria were classed as questionable and given a glucose tolerance test.
4. Subjects whose 2-hour venous blood glucose level in the glucose tolerance test failed to fall to approximately the fasting capillary blood level and who showed glycosuria were classed as diabetics.
5. Subjects whose 2-hour venous blood glucose level fell to the

fasting capillary level or below and who failed to show glycosuria when given the 2-hour glucose tolerance test were classed as nondiabetics.

Laboratory Procedures

Capillary blood obtained from finger pricks was used in the routine nutrition clinic. This sample was also used for the first blood sugar test. In the diabetic follow-up work, capillary and venous blood samples were used.

The blood sample (20 cu. mm.) was taken up in a Sahli pipette and transferred to 2 ml. of tungstic acid solution in a 5 ml. centrifuge tube. The samples were then stored in a portable ice box until the end of the clinic session, when they were stored in a deep freeze at −30° F. For the glucose determination the samples were thawed out, centrifuged, and a 1 ml. aliquot of the protein free solution was used in a modified Folin-Malmros procedure. The results were measured by means of a Coleman Junior Spectrophotometer.

The urine glucose was detected by use of Benedict's Qualitative Test. The amounts of glucose in the urine were indicated by the color changes; 1+ for green, 2+ for yellow, 3+ for orange, and 4+ for red or complete reduction.

Fasting-blood and urine samples were obtained between 8 a.m. and 10 a.m. before the subjects had ingested any food.

The glucose tolerance tests were done in the morning after 12- to 14-hour fast. A 2-hour glucose tolerance test was used as a matter of convenience for the subjects involved. Since most of them lived several miles from the clinic, it was considered advisable to shorten the procedure in order to inconvenience them as little as possible. It is commonly accepted that the 2-hour venous glucose should be at the fasting level or below following a glucose tolerance test. The fasting level was determined on capillary blood, as it is generally recognized that the fasting levels for capillary and venous blood are approximately the same. On this basis, we felt that a 2-hour tolerance test would be valid if a 2-hour venous sample were collected. A sample of capillary blood was taken; then the subject was given a pint of glucose solution containing 100 grams of glucose to drink. Samples of capillary blood were taken at the end of 1 and 2 hours. A sample of venous blood was also taken at the end of 2 hours. A sample of urine was collected also at the end of the test.

Single determinations were done on the nonfasting samples because of lack of time and assistance, while the fasting samples and glucose tolerance test samples were done in duplicate or triplicate.

Results of Study

Blood glucose determinations were done on 550 of 2,551 persons taking part in the nutrition survey. A total of 89 individuals had nonfasting, capillary glucose levels above 150 mg. per 100 ml. of blood. Of this number 77 participated in the follow-up and provided fasting blood and urine samples. Six persons with previously diagnosed diabetes were found in this group. From the data obtained on the fasting blood and urine, 6 others were classed as having diabetes and 51 were classed as nondiabetics. Glucose tolerance tests were given to 14 individuals who showed borderline values on the fasting samples. Ten new diabetics were discovered with the aid of these tests, making a total of 16 newly discovered diabetics in the survey. Detailed laboratory findings for the 16 newly discovered diabetics are shown in table 1. The prevalence of diabetes by age and sex is shown in table 2.

The height and weight determinations (table 1) when compared with Metropolitan Life Insurance tables indicate that about 50 percent of those having diabetes were of normal weight (assuming overweight as 15 percent or more above the values in the height-weight tables).

Discussion

There is no one method which will adequately screen out diabetics. Had a fasting urinalysis alone been done, six individuals who presumably had diabetes mellitus would have been overlooked (cases Nos. 871, 1146, 1183, 2197, NS–116 and NS–169). Conversely, had only fasting blood glucose determinations been done, one individual having diabetes mellitus (No. 1551 whose blood sugar was 116 mg. per 100 ml. of blood) definitely would have been overlooked and another possibly overlooked (No. NS–169 whose blood sugar was 120 mg. per 100 ml. of blood).

Newly discovered diabetics were informed of the diagnosis by means of a personal visit of a public health nurse. These individuals were referred to their private physicians for treatment. The private physicians were given, by letter, the details of the laboratory tests. Individuals who were diagnosed as nondiabetics were informed by letter that at the present time they did not have diabetes mellitus. Their private physicians were also advised by letter of the details of the laboratory tests.

In the minds of many, diabetes is usually associated with overweight. It is noteworthy that 50 percent of the newly discovered diabetics of this survey were within 15 percent of the average weight for persons in their age category.

The value of obtaining more than one type of data from subjects participating in a routine health appraisal study would seem to be a point for little argument. In the nutrition survey, the effort required to obtain additional information of a non-nutritional nature was not great, and it certainly produced material of value to all concerned.

Table 1. *Laboratory findings for 16 newly discovered diabetic* cases

[Diabetic Study in Ottawa County, Michigan, 1947–48]

Subj. No.	Sex	Age	Height (inches)	Wt. (lbs.)	*Percent overweight (O) or underweight (U)	History D. M. in family	Non-fasting blood glucose	Fasting blood glucose	Urine	Glucose tolerance test blood glucose mgs. per 100 ml.				Urine
							Mgs. per 100 ml.			Fast.	1 hr.	2 hr.	2 hr. ven.	
104	F	75	60	131	2 (U)		140	160	4+					
156	F	59	63	179	25 (O)		189	137	1+	119	294	288	281	3+
188	F	70	62	162	16 (O)	1 cousin	293	316	4+					
871	M	63	66	163	6 (O)	Father, mother, sisters, aunts, uncles	160	132		103	249	178	196	3+
905	F	65	60	149	11 (O)	Mother, aunts, cousins	310	198	2+					
1146	F	53	67	176	12 (O)	Mother	146	183		202	330	350	325	4+
1183	F	50	68	166	2 (O)		154	155		144	244	247	214	2+
1190	F	47	62	147	8 (O)		186	182	2+					
1478	F	46	63	167	20 (O)	Mother, 3 aunts	198	139	1+	126	226	181		3+
1493	M	68	70	173	Normal		190	220	4+					
1551	M	44	65	173	18 (O)	Grandfather	170	116	1+	114	221	177	129	4+
2180	F	60	61	139	1 (O)		250	192	3+					
2197	M	68	70	203	17 (O)		164	130		131	246	156	138	1+
NS-116	F	60	65	195	30 (O)		207	142		119	204	174	129	Trace
NS-121	F	69	66	210	37 (O)		191	130	1+	151	328	302	308	4+
NS-169	F	70	63	197	38 (O)		415	120		111	170	183	161	1+

*Percent above or below normal for that age group based on Metropolitan Life Insurance tables—ages 55 and over considered as in 55–59 group.

Table 2. *Prevalence of diabetes by age and sex*

[Diabetic Study in Ottawa County, Michigan, 1947–48]

Age in years	Total			Male			Female		
	Number tested	Diabetic		Number tested	Diabetic		Number tested	Diabetic	
		Number	Percent		Number	Percent		Number	Percent
All ages	550	22	4.0	217	6	2.8	333	16	4.8
40–49	269	5	1.9	105	2	1.9	164	3	1.8
50–59	144	3	2.1	58	0	0	86	3	3.5
60–69	90	11	12.2	38	4	10.5	52	7	13.5
70 and over	47	3	6.4	16	0	0	31	3	9.7

Summary

1. The prevalence of diabetes mellitus among 550 persons 40 years of age and over was determined.

2. A total of 22 cases of diabetes was discovered. This included 6 previously known and 16 newly discovered cases.

3. This number represents an incidence of 4 percent among this age group, which is similar to the 4.5 percent incidence in 1,456 individuals above the age of 35 years reported by Wilkerson (*8*).

4. The findings indicate there are a great many undiscovered diabetics among the general population.

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Dental Caries in Morphine Addicts

—As Determined by Clinical and Radiographic Examination—

By FRANK E. LAW, D.D.S., and JAMES W. RUBLE, D.D.S.*

The relationship of dental conditions and addiction to morphine has been reviewed in a treatise by Chompret and Dechaume (*1*). Their findings were based on the treatment of "several morphine addicts" and indicate an adverse effect of morphine addiction on dental health. Kobayashi (*2*) concluded that excessive occlusal attrition was associated with drug addiction and believed it due to increased brittleness of the tooth substance. Recently, Hecht and Friedman (*3*) pointed out a high incidence of cervical dental caries among female drug addicts confined in the House of Detention for Women, New York City. By comparison with a control group, they isolated cervical caries as one distinguishing oral characteristic of the drug addict.

The purpose of the present study was to determine the relationship, if any, between morphine addiction and dental caries experience through an analysis of observations on the dental condition of a group of white male morphine addicts. The subjects were patients in the Public Health Service Hospital at Lexington, Ky. Carious lesions detected by clinical examination and additional carious areas discovered radiographically were recorded.

During the period of the study—January to June 1945—two groups of men were examined. The first group was made up of 129 patients who were selected by examining every third white male morphine addict among those registered in the hospital. The second group comprised 176 addicts who were admitted to the hospital during the study period. The case histories of the individuals in these groups indicated that residence, during the first 8 years of life, covered 35 States, but tended to be concentrated largely in the eastern half of the United States.

Both groups included prisoners as well as voluntary patients. The average period of hospitalization has been shown (*4*) to be relatively short for both types of patients, 9 to 10 months for prisoners and 2 months for voluntary patients. The age distribution of both groups was similar, ranging from 20 to 60 years, the average age being 42 years. The average age of initial addiction for the combined groups was 25 years. No marked differences were found in the dental conditions of these two groups, and the data for all those examined were combined in this presentation.

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*Senior Dental Surgeon and former Senior Assistant Dental Surgeon (R), respectively, Public Health Service.

The teeth of each patient were examined, using mouth mirror and explorer with compressed air available for use as required. Bite-wing or periapical radiographs were made of all patients and carious lesions found radiographically which had not been detected on clinical examination were recorded. The patient supplied information on the drug to which he was addicted, the year addicted, and the time periods that he had not used the drug since the initial addiction.

Dental Caries and Addiction Period

If morphine addiction has an effect on the incidence of dental caries, the length of time the drug has been used should influence the prevalence of the disease. Table 1 shows for each given age range the dental caries prevalence (DMF rate) by the time period for which each individual stated he had used the drug. This time period is derived by deducting time off the drug from the time elapsed since first addicted. Examination of the data clearly indicates that length of addiction has had no effect, in this group of men, on dental caries prevalence.

Table 1. *Average number of decayed, missing or filled (DMF) teeth, per man, according to time the drug was actually used* as stated by each individual, among 305 men hospitalized for morphine addiction, by age*

Age	DMF rates, per man, by time intervals the drug was actually used				
	Less than 5 years	5–9 years	10–19 years	20–29 years	30 years and over
20–29	15.9	14.6	------	------	------
30–39	19.8	20.8	18.5	------	------
40–49	25.0	23.8	25.6	26.2	------
50–59	27.8	27.9	28.1	27.0	28.5

*Time interval since initial addiction less time the drug was not used

Comparison of DMF Rates

Relatively few statistical studies measuring the extent of dental caries in adult groups have been published. Those that are comparable in method of measurement and in age with this study group of morphine addicts are presented in table 2. While these population groups may not be directly comparable, they are presented to illustrate that the difference in rate between the morphine addicts and other study groups is not of a very high order of magnitude.

The basis of comparison utilized is the decayed, missing, or filled tooth rate per man, by age group. Teeth both decayed and filled are counted only once in determining this rate. DMF rates in this study

Table 2. *Average number of decayed, missing or filled (DMF) teeth, per man, among 305 men hospitalized for morphine addiction as compared with the experience in other adult groups, by age*

Age	Number morphine addicts examined	Average number DMF teeth per man			
		Morphine addicts	Tennessee industrial workers (*6*)	Metropolitan Life Insurance Company workers (*5*)	Army men (*7*)
20-29	36	15.5	8.8	16.4	9.7
30-39	86	19.7	12.3	19.8	12.4
40-49	113	25.4	16.0	21.0	----------
50-59	73	27.7	27.3	22.0	----------

have been based on 32 teeth in order that comparisons may be drawn with published studies.

The first of the comparative groups comprises 148 male textile workers examined in a Columbia, Tenn., knitting mill (*5*). In the second group (*6*), data for routine annual dental examinations among 2,736 Metropolitan Life Insurance Company male employees considered to be "a reasonably satisfactory cross-section" of the New York City population are presented.

The Army data (*7*) were derived from the dental examinations of 22,117 men at Camp Edwards, Mass. These records were selected to approximate proportionate population distribution by State.

The prevalence of dental caries was somewhat higher on the whole for the group addicted to the drug than for the Tennessee industrial workers or for the Army men for ages 20 through 49, although the rates approximated one another for the group aged 50 through 59. The rates for Metropolitan Life Insurance Company workers on the other hand more nearly equalled those of the group of morphine addicts.

It is realized that the results of a comparison of dental caries prevalence rates for groups in various sections of the country may be influenced by several important factors such as actual geographic differences, and differences in méthods of selection and diagnostic criteria. The Tennessee industrial workers were selected from an area in which the caries prevalence rate is below the average for the country. The Metropolitan Life Insurance Company workers were selected from an area of the country where the DMF rate is probably above the average. The Army men represent a highly selected group from which dentally unacceptable men had previously been rejected.

Hecht and Friedman (*3*) concluded that there was a high prevalence rate of cervical caries in the group of drug addicts which they studied. This was based on a comparison of the findings in a control group of which 70 percent were Negro patients, with the findings in an addicted group, only 27 percent Negro. Necessarily, there is some question as to the direct comparability of these groups. Cervical caries is shown to be 58 times the proportion of total dental caries in the study group than in the control group. It is doubtful that cervical caries can be expected to constitute as large a proportion of total caries in a low caries group as in a high caries group.

The amount of cervical caries in the Hecht and Friedman study group was high with 5.0 cervical lesions per individual at an average age of 34.7 years. In the present study, data on cervical caries are not available, as this was not recorded separately from other lingual and buccal surface caries. The total number of lingual and buccal carious surfaces (including cervical) per individual was 2.6 at an average age of 42 years, and 3.0 when ages above 50 were excluded, thus reducing the average for the group to 38 years.

In the textile workers examined in Tennessee, the average number of buccal and lingual carious surfaces per individual was 2.2, and the average age of the group was 33 years.

It is of interest to compare additional carious tooth surfaces detected by radiographs in this study with the findings of other authors.

Arnett and Ennis (*8*), in a study of 883 college students ranging in age from 16 to 21 in Drexel Institute, Philadelphia, reported that without the aid of radiographs 40.6 percent of the total number of carious teeth would not have been detected. Burket (*9*), in a study made on 460 human teeth obtained at necropsy, pointed out that the presence of caries was more often detected by a careful clinical examination than by the use of radiographs. White (*10*), in a study of Naval Aviation cadets, examined 800 who had previously been dentally rehabilitated and concluded that bite-wing radiographs located 4.4 carious areas per patient over and above those that had been clinically rehabilitated.

In this study, the radiographs were read individually by each author and additional carious areas which had not been apparent on

Table 3. *Additional newly carious tooth surfaces disclosed by radiograph as compared with number of decayed or filled (DF) surfaces found through clinical examination, among 305 men hospitalized for morphine addiction, by age*

Age	Number decayed or filled (DF) tooth surfaces found clinically*	Number of additional tooth surfaces found by radiograph to be carious	Percent of total tooth surfaces found to be carious by clinical examination and radiograph that were found by radiograph alone
20–29	506	20	4.0
30–39	1,063	57	5.4
40–49	924	23	2.5
50–59	304	7	2.3
	2,797	107	3.8

*By mouth mirror and explorer.

clinical examination were indicated on the record cards. As shown in table 3, there were 107 additional carious lesions found by radiographs.

Summary

A group of 305 white males addicted to morphine, hospitalized in the Public Health Service Hospital at Lexington, Ky., was examined to determine dental conditions. Information was also obtained relative to period of addiction and geographic origin of the patient.

The findings of the study indicate that in this group of men there was no apparent relationship between length of time the patient had used morphine and the prevalence of dental caries. Neither the level of dental caries prevalence nor of cervical caries prevalence in this group of morphine addicts appear to be unduly high.

Further examination of the data shows that the number of carious tooth surfaces that were detected by radiograph, but not by clinical examination, comprise only 3.8 percent of total carious tooth surfaces. It is indicated that in this study group, the use of radiographic examinations disclosed relatively little additional dental caries over that found by clinical examination.

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A New Coli O-Antigen Group

By W. H. Ewing, Ph. D. and F. Kauffmann, M. D.*

The systematic studies of Kauffmann (*3*, *4*) and collaborators (*5*, *6*, *7*, *8*) on the antigens of *Escherichia coli* cultures make it possible to differentiate 111 O-antigen groups. Further analysis of the antigens of *E. coli* cultures depends upon the determination of K and H antigens, utilizing the procedures outlined by Kauffmann (*4*). The purpose of this communication is to report the establishment of a new *E. coli* O group and to describe the relationship of the bacterium designated *Shigella guanabara* by de Assis (*1*) to the new coli O group.

Culture 1411/50 isolated from feces was received from Massachusetts in April 1950. The biochemical reactions of culture 1411/50 are those of typical *E. coli* types. Acid and gas are formed from lactose within 24 hours. The IMVIC reactions are ++−−, urea is not hydrolyzed, and the bacterium is motile. Adonitol and inositol are not acidified. The writers are indebted to Dr. de Assis for the guanabara cultures employed in the study. The 15 cultures of this type are biochemically and serologically alike. They are anaerogenic and nonmotile, but otherwise are like typical *E. coli* cultures as regards their biochemical reactivities.

Heated (100° C., 1 hr.) suspensions of both 1411/50 and guanabara cultures were tested in all of the coli O antiserums (01–0111) with negative results. Similarly, the suspensions did not react with O antiserums prepared with the eight members of the Alkalescens-Dispar group (*2*).

Antiserums were prepared by injecting rabbits with heated (100° C., 2½ hrs.) suspensions of cultures 1411/50 and guanabara (1685). These antiserums were tested with suspensions made from cultures of all known *E. coli* groups (01–0111) and of the Alkalescens-Dispar group. No significant serological relationships were established by these tests.

The results of cross agglutination and reciprocal absorption tests (table 1) indicate that culture 1411/50 and the guanabara type are very closely related but not identical. The cultures share a common antigen, *a*, and each contains an antigenic fraction which is not shared. The unrelated antigen in culture 1411/50 may be designated as *b* and in guanabara as *c*. The somatic antigens may be recorded as follows:

1411/50	0112*a*, 112*b*
Guanabara	0112*a*, 112*c*

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*From the Laboratory Services, Communicable Disease Center, Public Health Service, Atlanta, Ga., and State Serum Institute, Copenhagen, Denmark.

Table 1. *The relationship of* E. coli *0112 and the guanabara type*

100° C. test cultures	O-Sera			
	Guanabara		1411/50 (0112)	
	Unabsorbed	Absorbed by 1411/50	Unabsorbed	Absorbed by guanabara (1685)
1411/50 (0112)	*2, 560	†0	20, 480	5, 120
Guanabara (1685)	20, 480	5, 120	20, 480	0

* Reciprocal of highest dilution in which agglutination occurred
† 0 equals no reaction in lowest dilution tested (1-100)

Kauffmann (*5*) proposed a new classification of the family Enterobacteriaceae in which the bacterial types known as *Shigella alkalescens* and *Shigella dispar* are excluded from the genus *Shigella* and placed in a new group called the Alkalescens-Dispar group. The new group is included in the tribe Eschericheae. The decision to make these changes is based logically upon the results of studies upon the relationship of members of the Alkalescens-Dispar group to known *E. coli* (see *2* for references). Serologically, members of the Alkalescens-Dispar group are related closely to, or are identical with, certain *E. coli* O groups. Thus, it would be permissible to include the alkalescens and dispar types in the coli group as anaerogenic, nonmotile, coliform bacteria. This was not done at this time because it was thought that for practical purposes of reporting results to clinicians it would be preferable to establish a special group composed of these microorganisms.

Since the guanabara cultures are anaerogenic coliform bacteria similar to dispar cultures, it would be possible to include them in the Alkalescens-Dispar group. However, the writers do not recommend the enlargement of the Alkalescens-Dispar group beyond 01–08. The Alkalescens-Dispar group contains members with names which are familiar to laboratory workers and to clinicians. Newer types that are entirely unfamiliar may logically be included with the *Escherichia coli* types as members of the O group to which they are related. The guanabara type therefore is included in the new *E. coli* O group as O112*a*, 112*c*.

Summary

A new *Escherichia coli* O group is established. The O antigens are 112*a*, 112*b*.

The relationship of the guanabara type of de Assis to the new coli O group is described. The O antigens of the guanabara type are 112*a*, 112*c*.

The position of the Alkalescens-Dispar group is discussed.

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Incidence of Disease

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

Reports From States for Week Ended September 23, 1950

New cases of acute poliomyelitis reported in the United States during the current week numbered 2,170, a 1.5 percent increase over the 2,138 cases reported for the preceding week. This is the eighteenth consecutive week for which an increase has been reported. For the corresponding week in 1949, 2,187 cases were reported. The peak incidence of this disease is occurring later in 1950 than at any time during the past 20 years, with the exception of 1932.

The cumulative total (18,403) reported cases of poliomyelitis for the current "disease" year remains well below the corresponding total (30,350) for last year, the highest on record. However, this total is higher than it was in all other years during the past decade. The "disease" year for this disease begins with the twelfth week of the calendar year. Because of the unusually late peak incidence this year, the total number of cases reported in 1950 will probably exceed those of all other years except 1949 and 1916.

Comparative Data for Cases of Specified Reportable Diseases: United States

[Numbers after diseases are International List numbers, 1948 revision]

Disease	Total for week ended		5-year median, 1945-49	Seasonal low week	Cumulative total since seasonal low week		5-year median 1944-45 through 1948-49	Cumulative total for calendar year		5-year median, 1945-49
	Sept. 23, 1950	Sept. 24, 1949			1949-50	1948-49		1950	1949	
Anthrax (062)	2	------	(1)	(1)	(1)	(1)	(1)	32	40	(1)
Diphtheria (055)	136	173	204	27th	890	1,303	1,644	4,018	5,070	7,941
Acute infectious encephalitis (082)	24	23	23	(1)	(1)	(1)	(1)	679	533	455
Influenza (480-483)	1,105	812	812	30th	6,570	4,808	4,808	252,829	80,675	145,475
Measles (085)	534	464	540	35th	1,558	1,377	1,569	289,729	589,895	553,666
Meningococcal meningitis (057.0)	51	48	48	37th	51	48	48	2,850	2,564	2,686
Pneumonia (490-493)	674	870	-----	(1)	(1)	(1)	(1)	64,167	59,731	-------
Acute poliomyelitis (080)	2,170	2,187	1,425	11th	[2]18,403	30,350	16,739	[2]19,537	31,265	17,206
Rocky Mountain spotted fever (104)	14	11	11	(1)	(1)	(1)	(1)	420	521	495
Scarlet fever (050)	456	451	584	32d	1,857	1,780	2,464	42,027	59,446	64,567
Smallpox (084)	------	1	1	35th	--------	2	4	26	43	149
Tularemia (059)	13	18	17	(1)	(1)	(1)	(1)	721	905	748
Typhoid and paratyphoid fever (040, 041)[3]	82	105	105	11th	2,078	2,487	2,487	2,588	2,975	2,975
Whooping cough (056)	1,792	1,477	1,862	39th	117,101	55,214	100,165	95,565	45,181	74,147

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[1] Not computed.
[2] Deductions. Michigan, week ended Aug. 12, 2 cases; North Carolina, week ended Sept. 9, 1 case.
[3] Including cases reported as salmonellosis.

The cumulative total cases of poliomyelitis to date in the current calendar year is 19,537, compared with a total of 31,265 for the corresponding period in 1949. The 1950 total is the highest figure reported during the past 20 years, except 1949.

Compared with the preceding week, substantial increases in the incidence of poliomyelitis were reported for the East North Central States (473 to 533), West North Central (249 to 290), and South Atlantic (287 to 314). Significant decreases were reported for the New England States (132 to 99), Middle Atlantic (570 to 517), and Mountain (44 to 31). Little change occurred in the East South Central States (97 to 96), West South Central (131 to 132), and Pacific (155 to 158).

The States reporting the largest numbers of cases of poliomyelitis for the week were: New York (336), Ohio (143), Michigan (139), and Iowa (137).

The number of reported cases of diphtheria increased over the preceding week (97 to 136), but the cumulative total for the current calendar year (4,018) is well below all previous years. Reported cases of acute infectious encephalitis numbered 24, of which 13 were reported in California and 6 in New York. The cumulative total for the current calendar year is 679 cases, the highest during the past 5 years

For the current week, 456 cases of scarlet fever were reported compared with 344 last week and 454 for the corresponding week in 1949. The 5-year (1945–49) median was 584. The cumulative total number of cases of this diasese reported for the calendar year to date was 42,027 compared with 59,446 for the corresponding period last year. The 5-year median was 64,567.

One possible case of psittacosis, diagnosis doubtful, was reported in New York City. Two cases of anthrax were reported, one each in Maryland and New Jersey.

Deaths During Week Ended September 23, 1950

	Week ended Sept. 23, 1950	*Corresponding week, 1949*
Data for 94 large cities of the United States:		
Total deaths	8, 637	8, 640
Median for 3 prior years	8, 201	----------
Total deaths, first 38 weeks of year	348, 883	349, 323
Deaths under 1 year of age	637	709
Median for 3 prior years	651	----------
Deaths under 1 year of age, first 38 weeks of year	23, 574	24, 857
Data from industrial insurance companies:		
Policies in force	69, 578, 997	70, 247, 170
Number of death claims	11, 769	11, 448
Death claims per 1,000 policies in force, annual rate	8. 8	8. 5
Death claims per 1,000 policies, first 38 weeks of year, annual rate	9. 3	9. 2

Reported Cases of Selected Communicable Diseases: United States, Week Ended Sept. 23, 1950

[Numbers under diseases are International List numbers, 1948 revision]

Area	Diphtheria (055)	Encephalitis, infectious (082)	Influenza (480–483)	Measles (085)	Meningitis, meningococcal (057.0)	Pneumonia (490–493)	Poliomyelitis (080)
United States	**136**	**24**	**1,105**	**534**	**51**	**674**	**2,170**
New England	**2**	--------	--------	**27**	**2**	**22**	**99**
Maine	1	--------	--------	1	1	5	6
New Hampshire	--------	--------	--------	--------	1	--------	--------
Vermont	--------	--------	--------	1	--------	--------	6
Massachusetts	1	--------	--------	18	--------	--------	48
Rhode Island	--------	--------	--------	--------	--------	1	7
Connecticut	--------	--------	--------	7	--------	16	32
Middle Atlantic	**6**	**6**	**4**	**101**	**7**	**165**	**517**
New York	5	6	[1]	50	3	110	336
New Jersey	--------	--------	4	21	--------	25	65
Pennsylvania	1	--------	--------	30	4	30	116
East North Central	**6**	**2**	**27**	**141**	**9**	**51**	**533**
Ohio	1	--------	3	25	1	--------	143
Indiana	3	--------	--------	--------	--------	3	42
Illinois	--------	--------	--------	37	5	31	132
Michigan	2	1	1	25	3	13	139
Wisconsin	--------	1	23	54	--------	4	77
West North Central	**6**	--------	**16**	**28**	**4**	**68**	**290**
Minnesota	3	--------	1	5	1	44	40
Iowa	--------	--------	--------	1	--------	2	137
Missouri	--------	--------	--------	6	--------	3	37
North Dakota	--------	--------	--------	1	--------	12	2
South Dakota	2	--------	--------	8	2	--------	16
Nebraska	--------	--------	13	2	1	2	30
Kansas	1	--------	2	5	--------	5	28
South Atlantic	**45**	**1**	**273**	**21**	**3**	**83**	**314**
Delaware	--------	--------	--------	--------	--------	--------	4
Maryland	1	--------	--------	2	1	8	71
District of Columbia	1	--------	--------	--------	--------	13	16
Virginia	9	--------	230	11	--------	28	75
West Virginia	10	--------	11	1	2	7	31
North Carolina	14	1	--------	2	--------	--------	53
South Carolina	6	--------	24	3	--------	8	17
Georgia	3	--------	6	--------	--------	6	30
Florida	1	--------	2	2	--------	13	17
East South Central	**28**	**1**	**24**	**26**	**10**	**29**	**96**
Kentucky	3	--------	--------	19	4	--------	40
Tennessee	7	1	14	6	2	--------	27
Alabama	16	--------	8	1	4	16	7
Mississippi	2	--------	2	--------	--------	13	22
West South Central	**28**	**1**	**647**	**71**	**8**	**207**	**132**
Arkansas	6	--------	45	24	1	17	21
Louisiana	2	--------	--------	7	--------	18	21
Oklahoma	6	--------	45	3	--------	4	16
Texas	14	1	557	37	7	168	74
Mountain	**11**	--------	**91**	**49**	**2**	**23**	**31**
Montana	3	--------	--------	3	--------	--------	3
Idaho	--------	--------	20	9	--------	--------	7
Wyoming	--------	--------	--------	2	--------	1	--------
Colorado	1	--------	10	22	--------	9	5
New Mexico	--------	--------	--------	4	--------	10	3
Arizona	6	--------	61	2	2	1	7
Utah	1	--------	--------	7	--------	--------	6
Nevada	--------	--------	--------	--------	--------	2	--------
Pacific	**4**	**13**	**23**	**70**	**6**	**26**	**158**
Washington	--------	--------	2	7	--------	--------	33
Oregon	2	--------	21	8	1	6	40
California	2	13	--------	55	5	20	85
Alaska	--------	--------	--------	--------	--------	3	3
Hawaii	--------	--------	28	--------	--------	--------	1

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[1] New York City only.

Anthrax: New Jersey and Maryland, 1 case each.

Reported Cases of Selected Communicable Diseases: United States, Week Ended Sept. 23, 1950—Continued

[Numbers under diseases are International List numbers, 1948 revision]

Area	Rocky Mountain spotted fever (104)	Scarlet fever (050)	Small-pox (084)	Tularemia (059)	Typhoid and paratyphoid fever [1] (040, 041)	Whooping cough (056)	Rabies in animals
United States	14	456	--------	13	82	1,792	90
New England	--------	30	--------	--------	5	305	--------
Maine	--------	--------	--------	--------	--------	56	--------
New Hampshire	--------	--------	--------	--------	--------	1	--------
Vermont	--------	1	--------	--------	--------	45	--------
Massachusetts	--------	23	--------	--------	2	78	--------
Rhode Island	--------	--------	--------	--------	--------	69	--------
Connecticut	--------	6	--------	--------	3	56	--------
Middle Atlantic	1	56	--------	--------	13	399	33
New York	--------	[2] 23	--------	--------	3	153	26
New Jersey	--------	10	--------	--------	1	131	--------
Pennsylvania	1	23	--------	--------	9	115	7
East North Central	3	94	--------	3	10	378	11
Ohio	--------	34	--------	--------	4	67	3
Indiana	--------	9	--------	2	1	27	--------
Illinois	2	18	--------	--------	4	33	3
Michigan	1	23	--------	--------	1	122	5
Wisconsin	--------	10	--------	1	--------	129	--------
West North Central	--------	22	--------	--------	7	105	3
Minnesota	--------	4	--------	--------	--------	19	--------
Iowa	--------	1	--------	--------	--------	18	3
Missouri	--------	3	--------	--------	6	11	--------
North Dakota	--------	--------	--------	--------	--------	19	--------
South Dakota	--------	--------	--------	--------	--------	7	--------
Nebraska	--------	8	--------	--------	--------	3	--------
Kansas	--------	6	--------	--------	1	28	--------
South Atlantic	10	94	--------	3	7	193	12
Delaware	--------	--------	--------	--------	--------	--------	--------
Maryland	1	4	--------	--------	--------	38	--------
District of Columbia	--------	2	--------	--------	--------	5	--------
Virginia	2	20	--------	2	--------	44	1
West Virginia	--------	3	--------	--------	1	35	--------
North Carolina	7	40	--------	--------	1	56	--------
South Carolina	--------	10	--------	--------	1	4	5
Georgia	--------	14	--------	1	4	5	6
Florida	--------	1	--------	--------	--------	6	--------
East South Central	--------	99	--------	1	9	43	13
Kentucky	--------	30	--------	--------	--------	9	7
Tennessee	--------	42	--------	1	5	18	1
Alabama	--------	18	--------	--------	4	7	5
Mississippi	--------	9	--------	--------	--------	9	--------
West South Central	--------	21	--------	5	18	136	17
Arkansas	--------	3	--------	4	7	12	1
Louisiana	--------	2	--------	--------	2	7	--------
Oklahoma	--------	8	--------	--------	1	6	4
Texas	--------	8	--------	1	8	111	12
Mountain	--------	7	--------	1	3	99	--------
Montana	--------	--------	--------	1	--------	23	--------
Idaho	--------	1	--------	--------	--------	10	--------
Wyoming	--------	--------	--------	--------	--------	--------	--------
Colorado	--------	1	--------	--------	1	16	--------
New Mexico	--------	1	--------	--------	2	18	--------
Arizona	--------	3	--------	--------	--------	28	--------
Utah	--------	1	--------	--------	--------	4	--------
Nevada	--------	--------	--------	--------	--------	--------	--------
Pacific	--------	33	--------	--------	10	134	1
Washington	--------	5	--------	--------	--------	37	--------
Oregon	--------	1	--------	--------	--------	22	--------
California	--------	27	--------	--------	10	75	1
Alaska	--------	--------	--------	--------	--------	--------	--------
Hawaii	--------	--------	--------	--------	--------	--------	--------

[1] Including cases reported as salmonellosis.

[2] Including cases reported as streptococcal sore throat.

Rabies in man: Arizona, 1 case.

FOREIGN REPORTS

CANADA

Reported Cases of Certain Diseases—Week Ended Sept. 2, 1950

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Brucellosis					1						1
Chickenpox				1	8	62	9	3	21	18	122
Diphtheria				1	3		1				5
Dysentery, bacillary					18	4	2			2	26
Encephalitis, infectious							1				1
German measles			3		2	36		2	6	10	59
Influenza			8				1	14			23
Measles	2		3		41	70	5		7	14	142
Meningitis, meningococcal				1		2				1	4
Mumps			1		25	50	3	22	44	26	171
Poliomyelitis				3	3	15		14	16	1	52
Scarlet fever					12	7	6	1	9	5	40
Tuberculosis (all forms)	16		4	1	99	21	15	6	89	29	280
Typhoid and paratyphoid fever	1				11			1			13
Venereal diseases:											
Gonorrhea	4		3	3	118	73	31	23	67	101	423
Syphilis			1	2	46	21	2	14	6	6	98
Whooping cough				86	52	67	10		4	24	243

CUBA

Reported Cases of Certain Diseases—4 Weeks Ended Aug. 26, 1950

Disease	Pinar del Rio	Habana		Matanzas	Santa Clara	Camaguey	Oriente	Total
		Habana City	Total					
Cancer	4		17	18	19		24	82
Chickenpox					1		1	2
Diphtheria			1	2				3
Leprosy			4		1		3	8
Malaria							11	11
Measles		1	1	1	3	6	5	16
Poliomyelitis							2	2
Tuberculosis	3		16	17	11	3	12	62
Typhoid fever	8	5	13	3	23	10	29	86
Whooping cough			32				1	33

JAMAICA

Reported Cases of Certain Diseases—4 Weeks Ended July 22, 1950 [1]

Disease	Kingston	Other localities	Total
Chickenpox	3	39	42
Dysentery	1		1
Leprosy		2	2
Poliomyelitis	1		1
Puerperal sepsis	1		1
Scarlet fever		1	1
Tuberculosis, pulmonary	34	62	96
Typhoid fever	10	34	44
Typhus fever (murine)	5		5

[1] Report for week ended July 29, 1950, not received.

MADAGASCAR

Reported Cases of Certain Diseases and Deaths—July 1950

Disease	Aliens		Natives	
	Cases	Deaths	Cases	Deaths
Bilharziasis	1		71	
Diphtheria			4	
Dysentery, amebic	7		106	3
Erysipelas			17	
Influenza	155	9	11, 620	105
Leprosy	3		26	
Malaria	244	8	38, 374	79
Measles	12		116	
Meningitis, meningococcal			8	
Mumps			127	
Plague			3	3
Pneumonia (all forms)	27		1, 166	159
Puerperal infection			5	
Relapsing fever			1	
Trachoma	1		1	
Tuberculosis, respiratory	8	2	90	16
Typhoid fever	2	1	2	1
Whooping cough	5		196	4

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

The following reports include only items of unusual incidence or special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India (French). Cases of cholera have been reported in Pondicherry in recent weeks as follows: Weeks ended—August 19, 1950, 96; August 26, 58; September 2, 26.

Indochina. In South Viet Nam one fatal case of cholera was reported during the month of June 1950, and two cases during the month of July. During the week ended September 9, one case was reported in the Longxuyen area.

Plague

Ecuador. During the month of July 1950, 11 cases of plague were reported in Loja Province, distributed as follows: In Cerro Blanco Locality 2 cases, El Salado Locality 2 cases, 1 death, La Ollada Locality 2 cases; in Cariamanga Parish 2 cases in Algodonera Locality and 1 case in Chuchunga Locality; in Pindal Parish 1 case; in Las Huacas Locality, Alamor Parish, Puyango County, 1 case.

Smallpox

Cameroon (British). During the week ended August 12, 1950, 42 cases of smallpox, with 7 deaths, were reported in the provinces of British Cameroon.

India (French). Reports of smallpox in the ports of French India for the current year have been received as follows: January 1–April 1, Karikal 1 case, Pondicherry 12 cases, 6 deaths; April 2–July 1, Karikal 1 case, Pondicherry 59 cases, 29 deaths; July 2–29, Pondicherry 99 cases August 6–26, Pondicherry 34 cases, 7 deaths; week ended August 26, Yanaon 9 cases; week ended September 2, Pondicherry 18 cases.

Indonesia. Smallpox has been reported in Surabaya, Java, as follows: Week ended September 2, 1950, 151 cases; week ended September 9, 174 cases.

Yellow Fever

Gold Coast. The fatal suspected case of yellow fever reported July 28, 1950, in the port of Accra (see PUBLIC HEALTH REPORTS, September 15, 1950, p. 1200) has been confirmed.

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The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

The Public Health Reports, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The Public Health Reports is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the Public Health Reports, reprints, or supplements should be addressed to the Surgeon General, Public Health Service, Washington 25, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington 25, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

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Public Health Reports

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PUBLIC HEALTH SERVICE

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Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE

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Public Health Reports

Vol. 65 • OCTOBER 20, 1950 • *No. 42*

Arthritis as a Public Health Problem

By Leonard A. Scheele, M. D.*

Arthritis, rheumatism, and related ailments qualify as a public health problem. This group of diseases is the greatest single cause of protracted illness. Their prevalence is many times greater than that of any other chronic disease. Rheumatism is close kin to poverty and the vicious circle of disability and dependency. A goodly proportion of arthritic patients are receiving no care—or poor care.

For many years, physicians interested in this problem have been convinced that expert treatment can alleviate or arrest rheumatic disorders and prevent severe disabilities. They have been convinced, too, that medical research in this field needs expansion in basic studies and clinical and epidemiologic investigations. Out of this professional concern and conviction has emerged the American Rheumatism Association to focus attention on the problem and provide a forum for discussion and interchange of experience.

The national movements against tuberculosis, venereal diseases, cancer, and heart disease began in the same way. But, despite the promise of such beginnings, progress in these fields was slow until two specific conditions had been met.

First, specific advances in research had to come, stimulating further exploration of neglected areas and encouraging wider application of existing knowledge and skill. Second, public demand for expanded research and services had to increase, bringing to bear on official and voluntary agencies inexorable pressures for action. The result was the combination of public and private effort which characterizes our American plan to solve these critical health problems.

During the past 18 months, those conditions have been largely met for a forward move against arthritis. The work of Dr. Philip S. Hench and Dr. Edward C. Kendall on cortisone and ACTH has been a precipitating event in scientific medicine which brings us to the verge of a new era in research and practice in this field. The full significance of this event will not be apparent for many years to come.

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*Surgeon General, Public Health Service. From a speech delivered at a session of the American Rheumatism Association, San Francisco, Calif, June 23, 1950.

However, we can already see one result in increased demand for expanded public health action. That demand is expressed by the American people through their representatives in Congress. Two proposals are being considered by Congress at the present time. First, the House of Representatives has approved \$3,600,000 [1] for the Public Health Service's 1951 program to expand research on cortisone, ACTH, and related compounds. Second, legislation is now before Congress,[2] and has been passed unanimously by the Senate, which would authorize the Public Health Service to establish a program of research, aid to research and professional education, and health services in arthritis, rheumatism, and other metabolic diseases.

The Public Health Service and our advisory groups of experts have given a great deal of serious thought to the entire problem. The conclusions drawn, therefore, represent the main points of agreement by many individuals, all of whom are earnestly and actively concerned with solutions of the multiple and intricate problems of arthritis. Probably none of us think that decisions of today can stand long in such a rapidly developing and changing field; but, if science and society present us with opportunity, we in turn must present an orderly and sound plan for action.

The Opportunity Is Unique

The nature of arthritis and the present status of medical knowledge about the disease offer a unique opportunity to develop, both in research and services, programs that are integrated with efforts in many other fields.

I stress this point because the experience of the Public Health Service shows that exclusive emphasis on disease categories tends to have a restrictive effect on research and to encourage the development of unbalanced services.

Fortunately, the work of Hench and Kendall, Thorn, Albright, their predecessors and their co-workers—a whole generation of effort—has made virtually impossible a narrow research program on arthritis and rheumatism. Within less than a year, sufficient evidence has accumulated to show that research in cortisone and ACTH will be research in the total field of chronic disease, as well as in mental illness and some acute diseases.

Obscure in origin and resistant to treatment, the so-called degenerative diseases—cardiovascular-renal disorders, cancer, arthritis, rheumatism, and metabolic diseases in general (an endless list!)—have challenged the best thought in research and medicine for several generations. Until last year, however, there had been no convincing evidence to provide scientists with a clue to a common factor in the causation of such diverse conditions as rheumatoid arthritis, status asthmaticus, nephritis, and rheumatic fever. Diseases not previously known to be associated with hormonal imbalance must now be studied in the light of their relation to hormones. Moreover, clues to such phenomena as immunity, anaphylaxis, allergic responses, and shock await intensive exploration.

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[1] This sum was subsequently reduced to \$2,500,000 as part of the total cut of \$550,000,000 in the Federal Budget, 1951, as directed by the Congress.

[2] Subsequently passed by the House, and approved by the President, August 15, 1950.

Because the new leads are promising, more scientists will be attracted to basic studies of human biology. In their study of disease states, they will search for a common cause, as contrasted with the former emphasis on specific etiology and localized pathology.

Research and scientific medicine have been moving gradually toward a new theoretical and clinical synthesis. With the advance of biochemistry and biophysics, there have been vast improvements in the methods, measurements, and instruments available to medical research. As a result, closer integration of the various scientific disciplines has occurred. Just such an interdisciplinary approach played an important part in the accomplishments of Hench, Kendall, Slocumb, and Polley.

Many scientists and the public have placed major emphasis on the search for specific causes or for cures of specific diseases. Up until now, it has been difficult to convince society that investments in basic research could yield far reaching results, not only in a single disease, such as rheumatoid arthritis, but in a variety of conditions which affect a large proportion of the world's population.

It would be a tragedy if, in our eagerness to exploit our new advantage over arthritis, we failed to develop the broadest possible research effort in biology and a wide range of diseases. The sooner we break the barriers of specialism in research, the sooner we shall find definitive answers to specialized disease problems. This is the unique opportunity which is now presented to medical scientists.

The same integrated approach is essential in the development of services for persons who suffer from arthritis and rheumatism. Specialists of the New York Postgraduate Medical School and Hospital said 10 or 12 years ago: "If a patient with acute rheumatoid arthritis . . . did have at his disposal proper hospital facilities, comparable to those for tuberculosis, where he could receive fresh air, good food, sunshine and rest, plus all the medical and physical therapy measures we know to be of value in rheumatism, it is certain that the incidence of deforming arthritis would be markedly reduced."

The same basic requirements in facilities and services are needed today—not only for the millions of arthritic cripples, but also for the additional millions crippled by accidents and by other chronic diseases. In our planning for care of the chronically ill and disabled, arthritis and rheumatism loom as a major problem. Services in that field will be all the better, all the more effective, if they are planned as an integral part of the community's total effort for the chronically ill.

Prospects for Research

The Public Health Service has broad authority to conduct and to aid research on the physical and mental diseases and impairments of man. We do not need a special act of Congress to initiate investigations or aid in a particular field. We do, however, need adequate funds to assure a well-balanced program, and these funds often are not appropriated until the Congress creates a specific program in a particular field.

Last summer, recognizing the great importance of the first reports on cortisone and ACTH, I appointed an arthritis and rheumatism study section to advise the Public Health Service on how we could best foster research and health services in this field. Dr. Hench is the chairman of this study section which includes nine other experts—all outside the Government. Other study sections, established several years ago, also have been especially interested in arthritis and rheumatism, notably the sections on endocrinology and metabolism and gerontology.

The Public Health Service has also consulted frequently with other scientists, with other Federal research groups, and with the manufacturers of cortisone and ACTH. Throughout the year, our five National Advisory Councils—on general medical research, cancer, heart disease, mental health, and dental research—have discussed thoroughly the problems of metabolic diseases as well as of cortisone and ACTH.

In a joint meeting last February, the councils made specific recommendations to the Public Health Service for immediate action in safeguarding the research effort on these new drugs and similar compounds. At that time, medical investigators in many parts of the country had so increased their demands for cortisone and ACTH that manufacturers could no longer supply the drugs for research without cost. The advisory councils commended the manufacturers for having distributed cortisone and ACTH free of charge to qualified investigators throughout the early stages of investigation.

In the opinion of the councils, the most important single question in medical research at the present time is how to make sure that the drugs, and similar new substances, will continue to be available for investigators. The councils, therefore, urged that research be expanded in hospitals, medical schools, universities, public and private laboratories. Expanded research in hormonal compounds should be in addition to research in other important fields—not at the expense of the other programs.

During the past few months, we have awarded 102 financial grants, totaling nearly $1 million ($901,445) to institutions outside the Federal Government for research in cortisone and ACTH.

If 1951 appropriations to the Public Health Service permit us to increase our support of research in this particular area, we and our advisors believe that about two-thirds of the sum should go into grants for clinical studies, and the remainder into laboratory investigations.

There is an enormous job waiting to be done in the laboratory. The production of cortisone has been increased to the point where one of the manufacturers can now distribute the drug in limited quantities to the Nation's hospitals. Even so, we must continue the search for new raw materials. The supply of the present starting material for cortisone is limited in any case. So also is the source of ACTH, and this drug also requires standardization. New raw materials or short-cuts in synthesis would bring us nearer to adequate supplies for the millions of arthritic patients who might benefit from hormonal therapy, if the current research program proves their ultimate safety and value. We have not reached that goal yet. At a market price of (roughly) $100 per gram, cortisone and ACTH still pose major problems in medical economics.

Synthesis of other steroids and related drugs is another urgent need. As the antibiotics multiplied rapidly in a few years after penicillin was first proved effective, so we should expect many new hormonal drugs which may even supplant cortisone and ACTH. Studies are already under way on several steroids that may give valuable leads.

Obviously, intensive study must be devoted to the biological effects of cortisone, ACTH, and other steroids. New substances must be screened in the laboratory to determine their physiological activity, toxicity, and relationships with other substances.

Clinical studies offer an almost endless list of promising clues. Our best thought on this aspect of research with cortisone and ACTH, however, leads us to stress the need for broad studies in human biology—as well as for study of the therapeutic effects of these substances in specific diseases.

We must, in fact, encourage scientists to use these new tools as a means of advancing knowledge of normal man and his physiological processes in health. There is, indeed, too little research on this positive line. Intensive study of steroid metabolism may uncover basic mechanics that account for the difference between health and disease. A common factor in the metabolic process, for example, may be responsible for maintaining normal functions in various organs not previously believed to be related, or some one series of chemical reactions may be essential for maintaining many substances normally present in the body. Much fundamental study must be done before such conclusions are reached, but the possibilities are tremendous.

Major emphasis, of course, must be given to clinical studies of the effectiveness of cortisone and other hormonal substances in various diseases. Practical and humanitarian reasons dictate such an emphasis.

Cortisone and ACTH probably are here to stay. The indiscriminate use of these drugs, however, must be prevented. They cannot be prescribed or administered as safely as can aspirin, although the public has been led to believe that this is so.

With the wider distribution of cortisone, new problems will arise. Careful clinical management of patients who receive the drug in the Nation's hospitals will be a tremendous responsibility on physicians. The utmost care in noting and controlling side effects will have to be exercised by competent clinicians. All of us know—best of all the discoverers and pioneers—that our knowledge is far from complete as to the effects and the effectiveness of these new drugs.

There is so much promise and so much enthusiasm, however, that we must press on to perfect our knowledge and techniques through careful clinical investigations. Naturally, emphasis will be placed on arthritis and rheumatism in clinical studies of cortisone and ACTH. Many of the investigators who have received grants from the Public Health Service are working in that field. But others are studying the effects of the drugs on allergic hypersensitivity, chronic sinusitis, diabetes, renal function, cirrhosis, and hypertensive vascular disease.

Studies have already shown that ACTH may terminate an episode of acute rheumatic fever; and with suitable continuation therapy, in conjunction with antibacterial agents, may, in fact, stop further progress of the disease. These preliminary results lead us to stress the importance of further work in this area. If effective therapy is developed for rheumatic fever, science and society will make a tremendous forward move in child health and in the prevention of a vast amount of disabling heart disease in adults.

Other leads which need to be followed are in the fields of cancer, other heart diseases, and psychiatric disorders—as well as in a wide variety of metabolic disturbances.

Up to now, I have been dealing entirely with the prospects for research specifically related to cortisone and ACTH. I do not want to give the impression that we are not equally concerned about the development of a broad research program on the rheumatic diseases. We are deeply concerned. Discovery of new scientific principles in arthritis and rheumatism has, indeed, been so rare in the past century that until cortisone and ACTH were reported, one could scarcely call our advance in this field "progress."

What, for example, is the status of diagnosis? What scientific data have we on the psychic components in arthritis and rheumatism? What are the relationships between rheumatism and occupation, age, climate, other environmental and social factors? Much work also remains to be done in nutrition, physical medicine, rehabilitation, and a dozen other fields related to the causes, prevention, and cure of arthritis.

In recent years, the Public Health Service has been supporting several long-term studies on some of these basic problems in arthritis and rheumatism. We feel that, generally speaking, the most valuable contribution which the Public Health Service can make to medical research is the support of investigations which require substantial financial aid over a number of years. Especially is this necessary in clinical studies of chronic diseases. Adequate series of cases must be developed and followed, since the human organism develops more slowly in both its normal and pathologic processes than do laboratory animals. Thus, in some diseases the answers may not be found until after the scientist who initiated a study, has himself succumbed to man's universal fate.

The following studies illustrate the types of research in arthritis and rheumatism that the Public Health Service is supporting. Two years ago, Dr. Paul Holbrook of the University of Arizona began a study of amino-acid metabolism of rheumatoid arthritis. We expect the project to continue two more years.

Last year, a 5-year study was launched by Dr. Walter Bauer and Dr. Jerome Gross of Massachusetts General Hospital. This is a study of derangement of mesenchymal tissues in aging and rheumatic disease. Beginning this year, supplementary grants will be made for the use of ACTH in this project.

Dr. Roland A. Davison of Stanford University is now in the second year of a project on steroid metabolism in spondyl arthritis. Dr. John H. Talbott, of the University of Buffalo is conducting a study of the pathogenesis and treatment of gout, using various drugs. Dr. Ernest D. Gardner, at Wayne University, is continuing a basic study of physiological processes in movable joints and structures.

In relation to psychic components in arthritis and rheumatism, Dr. Franz Alexander of the Chicago Institute of Psychoanalysis is conducting a 4-year study of arthritic patients at Michael Reese Hospital. The study seeks to delineate the psychodynamic pattern of arthritic patients and its relation to physiological responses.

Research and Service Goal

The goal of a program for research and health services in arthritis was defined for society very simply 2,000 years ago: That is, "to make the lame to walk and the crooked straight."

None of us can forget that goal for we have seen many examples of the crippling effects of rheumatism. We have seen, too, the almost miraculous improvements in some of the few individuals who have access to the best modern care.

At least 200,000 persons in the United States are totally and permanently disabled by arthritis and rheumatism; another 800,000 are partially disabled. And it is estimated that another 6 million have some form of rheumatism or arthritis. These estimates may be low, because there are no reliable data on the incidence of these diseases in large population groups which lack elementary medical and health services.

The Public Health Service has long been seriously concerned about this massive suffering in our midst. I have reported on some of the steps we have taken recently to deal with the basic biological and medical problems involved. I have mentioned also the proposals in Congress for expanding Federal aid to research on cortisone and ACTH, and for establishing a broad arthritis and rheumatism program.

The Public Health Service is eager to do its part. Our six institutes in the National Institutes of Health are ready and willing to collaborate in such an effort. Our Division of Chronic Disease is ready and willing to help. States and communities plan services for rheumatic sufferers. These plans might include the development of ambulatory services, home care programs, and rehabilitative services for rheumatic patients.

The Public Health Service, however, is only one small unit in the total Nation-wide effort that will be needed. We hope to be able to join with the American Rheumatism Association and with our colleagues in other voluntary agencies and institutions in a Nation-wide offensive against arthritis and rheumatism.

Multiple Screening and Specialized Programs

By JOSEPH W. MOUNTIN, M.D.*

Much of the success that public health programs have achieved in the past can be traced to the perfection and focusing of precise techniques on specific problems. Nowhere is this more apparent than in the detection and control of specific diseases. Fundamental to the control program are exact and simplified methods of case finding.

Public health is indebted particularly to the venereal disease control program for giving mass application to many valuable case-finding techniques. Following the remarkable success met by venereal disease workers in this field, others developed similar techniques or variations of them. Although they used an entirely different procedure, tuberculosis control workers incorporated many of the administrative measures developed in the venereal disease control program. Other programs followed suit; for example, a case-finding instrument was developed in diabetes control and is being put into mass use.

It is now proposed to combine these separate procedures and to bring in still others under a single mass testing program. This approach, termed multiple screening, is essentially the extension and expansion of the mass screening examination, and the application of this technique to the chronic disease field. Thus, the venereal disease and the tuberculosis control programs are being asked to integrate their case-finding activities into this larger, more comprehensive area.

The question has been posed, and quite appropriately, by venereal disease workers and others as to how the multipurpose approach is likely to affect the success of a specific program. How and when should other tests be brought into the battery? Will they contribute to or retard the progress of the individual programs? Or would the economy and over-all effectiveness of joint case finding overbalance any possible individual losses, granted that there would be some?

Although few questions in the complex and intensely human business that is public health can be answered categorically, I will try to point out some of the considerations which might make a logical decision possible. And in doing so, I will discuss some of the broad issues involved in multiple screening and their implications for other public health programs.

---

* Assistant Surgeon General and Associate Chief of the Bureau of State Services, Public Health Service. Consolidation of remarks made at Venereal Disease Seminars in Chicago, New York, and Washington, D. C., during the spring of 1950

Multiple screening is a promising public health tool. Its drama, its universal appeal, its seeming simplicity and economies have captured the imagination of public health administrators and the general public alike. The demand for this procedure is growing faster than it can be met by the resources of public health organizations. In fact, there is the not inconsiderable danger that multiple screening will be adopted as routine public health practice before some basic questions are answered and before adequate safeguards are employed. While recognizing the promise of multiple screening as a case-finding instrument, we must at the same time be aware of its present limitations and weaknesses.

In theory, multiple screening should make a significant contribution to the control or stabilization of many diseases which now go unchecked. And, indeed, it will make that contribution, provided it is part of a larger and fully worked out control program. Screening is just one rung of a ladder which might be labeled chronic disease control—other rungs are diagnosis, follow-up, and treatment. Granted that screening, or case finding, is the first step; unless, however, it is part of a program that makes provision for diagnosis, follow-up, and treatment, screening by itself loses much of its potential value.

Moreover, even the practicability of multiple screening as a case-finding technique has been questioned. What tests are ready to be included in the battery and which should be withheld for further modification and perfection? What cautions have to be observed and what difficulties may we expect to encounter? And finally, what is the impact of multiple screening on such well-established and long-term programs as tuberculosis and venereal disease control?

As a starting point, it may be helpful to review briefly just what is meant by multiple screening and to trace briefly its evolution. Essentially, the multiple screening examination for adults is an attempt to carry out at one time several procedures heretofore administered separately, and to add some new ones as yet unattempted. In a limited way, its objective is that of the more extensive periodic health examination inaugurated some time ago, namely, the detection of physical impairments and chronic ailments in their incipient stages. Multiple screening is the streamlined and digest-size counterpart of the periodic health inventory.

Mass screening techniques for specific diseases, as indicated earlier, are established and effective case-finding instruments. Such devices as serologic examination for syphilis and chest X-ray examination for tuberculosis made it possible to bring together great numbers of individuals for the detection of a specific condition. It is extremely logical and tempting to say: Why conduct these tests separately at double expense and double consumption of the citizen's and health worker's time? Why not accomplish both purposes at a single clinic or testing visit? And why not include other examinations at the same time, thus detecting many conditions which might otherwise go unchecked and contribute to chronic disability?

On the surface this seems like a golden opportunity. And, theoretically, it is a golden opportunity, for it offers the advantages of unity, economy, and better, more complete services for the people. Combining several tests at one time means a saving in administrative expense, thriftier use of personnel and equipment, and more significant results (*1*).

Other advantages have been cited for this technique (*2*). Prominent among these is its flexibility. The tests may be simple or elaborate, limited to a few examinations or including a complete battery, depending on the resources of the community which is conducting the program. Finally, multiple screening has the undeniable value of public appeal. The prospect of a "one-package" 15-minute examination for a variety of diseases or conditions which might impair health is much more enticing than facing a test for syphilis one week, tuberculosis the next, and diabetes the third week. Even more important, however, is the educational effect of multiple screening. It undoubtedly both teaches and promotes the necessity for complete periodic inventories.

From the point of view of public health practice, multiple screening makes possible a unity and integration of programs, an approach that leading public health workers have been advocating for some time. We have been trying to achieve a closer coordination of our programs within the Public Health Service; our recent reorganization was one step in this process. Other health agencies have also been subordinating the specialized and narrow approach inherent in specific disease control programs in favor of a broader, more generalized view of health. Multiple screening is one of the most dramatic measures yet advanced for making that ideal a reality.

It would be unjust, therefore, to question the soundness of the basic concepts which underly the multiple screening program as a whole. On the other hand, however, it is perfectly in order to examine some of the obstacles which face the program and to urge certain precautions before this procedure is recommended as standard practice for public health agencies. And while I advocate that mass serology for syphilis and X-ray for tuberculosis be combined with other tests, where practicable, I think it is incumbent upon those who are responsible for specific health activities to understand the implications of such a step.

Multiple screening, as I have already indicated, promises to be most useful in the chronic disease field where, in the absence of specific preventive measures, early detection and prompt diagnosis are the most important factors in the control program. The question arises as to which tests should be included in the battery. Or more specififically, which tests are ready for inclusion? Administratively, the primary considerations should be the speed, economy, and accuracy of the tests. As far as the mechanics of clinic operation are concerned, therefore, the use of auxilliary personnel and the conservation of the client's time must have priority. The group should include no test which requires more than a few minutes of clinic time, which causes any great amount of discomfort, or which requires highly technical persons in the clinic line of flow.

The examinations themselves must be considered from two standpoints: first, their inherent validity or the accuracy of the tests as indicators of need for further examination; and second, the reliability of the tests as measures of prevalence rates. The former involves mainly the so-called screening level to be used.

Systolic blood pressure is commonly included in the screening line. However, there is no general agreement among the medical profession as to the level at which the reading might be considered significant (*3*). Should the systolic level be set at 160? Or should some different points be adopted, depending on such factors as age, sex, and other personal characteristics, like susceptibility to the excitement that accompanies the measurement of blood pressure in a screening line?

Hemoglobin level has been used in clinical medicine for a long time. But we are still not in agreement as to the best method for hemoglobin determination nor about the readings that are really critical for persons in the general population (*4*).

Great advances have been made in recent years toward perfecting simplified blood sugar tests for detecting the presence or determining the likelihood of diabetes. However, there is still some doubt as to the amount of blood sugar that should be considered significant. Diabetes testing also involves the problems of food intake and the time elapsed since the last meal, factors which are difficult to control or assess in a mass screening clinic.

Thus, the specificity and sensitivity of many of the screening devices have yet to be fully established. The danger of permitting tests to be used which have not been thoroughly validated cannot be overemphasized. One obvious result of unperfected screening operations is that too many persons are referred for definitive diagnosis when, in fact, they do not have the disease in question—the so-called false positives—and many persons who should be referred for further services are passed over—the so-called false negatives.

The implications of a large number of nonproductive responses are very significant. Public health agencies may be laid open to charges of waste and incompetence. Moreover, they may see good will turned into resentment when some persons who are screened as positive must spend time and money only to find that nothing is wrong and when others become obviously ill shortly after a visit to a screening clinic has failed to reveal any danger signs.

Unconfirmed and borderline referrals may also cause irritation among the medical profession as well as the patient. Although the physician may at first welcome a procedure which brings patients to his office when there is still an opportunity for early and successful treatment, he may very well view with mixed feelings a parade of false positives and negatives. Early enthusiasm is likely to be dampened among physicians who see their patients losing confidence in them, or who are at least confused about the whole procedure.

Although the results of large-scale screening examinations will almost inevitably be used to cite general prevalence rates, multiple screening alone does not ordinarily provide a reliable estimate of the prevalence of the diseases under study. One reason why this is generally so is because the people who are screened rarely represent an accurate total cross section of the population. And, of course, the usual mass screening survey offers no information about people who do not take part in the survey. Because over- or understatement of prevalence rates can seriously misguide public health activities, sample studies of the entire community should be undertaken to determine the reliability of the finding of the screening process as an indicator of prevalence rates. Data should be gathered on demographic characteristics, occupational status, approximate number of nonparticipants in the study, and the reasons for their lack of participation. The studies should also provide a comparison of the disease characteristics of participants and nonparticipants and an analysis of the prevalence rates of disease and other physical characteristics, as measured by the survey techniques, for the total population. By probing into the attitudes toward the multipurpose survey and by discovering the reasons for lack of participation, the studies might also serve as guides in planning future case-finding campaigns.

There are other extremely important questions that must be answered before a case-finding technique can be said to have substantial value as a public health measure. These involve all the procedures usually included in the term "follow-up." How are positive cases confirmed and what methods are used to refer them for treatment? What medical care do they receive? How is the care financed and what is the resulting load on medical and related personnel and facilities? What differences are there in the medical care received by significant subgroups in the population, i. e., income groups, occupational groups, etc? What provisions are made for medical social services, for home care and nursing services, for rehabilitation? How adequately are comprehensive reports and records collected and analyzed to give us a true picture of the extent of the public health problem?

Follow-up measures for the chronically ill are as yet scanty and exploratory in contrast to the well-established and smoothly functioning programs for persons with tuberculosis and venereal diseases. Nor is this a reflection on the nascent chronic disease control programs. What is involved here is a whole new set of long-term relationships with physicians, hospitals, and other community resources which must be carefully thought out and developed. But until those services do evolve and a thoroughgoing follow-up program is set in motion, multiple screening for the chronic diseases can be of only limited effectiveness, and if pursued too hastily, can bring established screening procedures into disrepute.

Before going on to further comparisons of the multipurpose process with screening for specific diseases, it might be well to mention briefly some administrative obstacles which must be carefully considered before multiple-testing programs can be widely adopted. First of all, there is the important matter of the cost of a multiple-testing clinic. Despite the claims of economy effected by a combination of several tests, the costs of multiple screening range from $1 to $1.50 or $2 for each person examined, depending on the number of tests included in the battery and the amount of volunteer help that can be obtained. When we bear in mind that even today a health department which operates on a total budget of $1.50 per capita is considered rather well supported, the financing of routine screening appears rather disproportionate. Of course, the costs to the health departments depend on the number of persons screened and the frequency of the examinations.

But there are other expenses after the initial test, such as the cost of rechecking and the $5 to $10 or $50 expenditure by the patient who is referred to a physician for final determination as to significance of the findings. Thus, the costs involved in running the clinic plus the expenses entailed on the part of the patient are great. And consider the embarrassment to health agencies when all this expense merely "discovers" a great number of results that are erroneous—either on the positive or the negative side—or which are already known.

Some critics have maintained that many of the results cited for multiple-screening surveys include relatively minor defects as well as conditions already known to exist (*5*). They have even questioned the propriety of testing for various defects for which no public health control measures exist. If a person is informed after a visit to a screening clinic that he is obese, is he thereby helped to improve his health, or is he merely confused? Certainly, public health stands open to the accusation of waste and frivolity if it merely "uncovers" conditions of doubtful public health significance, or about which little, if anything, is proposed.

We are justified in saying, I think, that it would be unfortunate to jeopardize so potentially valuable a procedure as multiple screening by pushing it prematurely. The reaction that health departments are apt to get from tests of doubtful validity, from the lack of adequate follow-up procedure, and from the paucity of remedial measures may serve to set back the chronic disease program rather than advance it. A technique with so much promise and with such far-reaching possibilities deserves careful preparation and detailed analysis before it can take its rightful place as an important tool of public health practice.

In determining the impact of multiple screening on specific programs, we must ask ourselves a fundamental question. What is the purpose of mass screening? Is it just a device to get people to attend a screening clinic for their own general information? Or is it a part of a well-planned and sustained campaign to solve a particular health problem? If it is the former, then multiple screening is probably the best answer. I do not say this disparagingly, for there are important and valuable byproducts of this type of approach. For example, from multiple screening, in conjunction with pre-survey and post-survey studies and adequate follow-up, we can get some ideas of the extent of such diseases as diabetes, hypertension, and heart disease. And we encourage the habit among large groups in the population of seeking more frequent and more regular physical examinations.

However, if our goals include the net gains for a health program, then there is much to be said for the specific approach. When a particular condition, such as syphilis, tuberculosis, or diabetes, is the object for attack, it is possible to direct our appeals to groups in the population in which such conditions are known to have the highest prevalence. These groups may be quite different in composition with respect to age, social status, or other factors. In diabetes case finding, we would look particularly for people who are over 40 years of age, who are overweight, or who are relatives of known diabetics. We would look for entirely different groups, however, if we were attempting to track down syphilis.

It should be realized that a multipurpose clinic which emphasizes the maintenance of general health (as it must, if it is to test for several unrelated conditions) is likely to attract a large proportion of people in average economic circumstances. And, if the clinic is conducted during the working hours, it probably will be attended principally by older men and women. This is, perhaps, all to the good if we are concentrating on bringing out certain conditions, such as hypertension; on the other hand, it is of extremely doubtful value for solving other health problems. When economy is claimed for multiple-testing programs, therefore, we must bear in mind that it pertains only to the economy of the screening operation itself. Measured in terms of the beneficial results that can be expected from any specific program, multiple screening might well prove quite expensive.

Despite our goal of integration, any program must have some limitations, must be planned and evaluated against some specific objectives. Otherwise, how can we measure progress? How can we determine next steps and plan for the future? And the dragnet idea of case finding is always questionable with any given health department budget.

In popular literature multiple screening has been likened to a "shotgun hunt." This is a rather apt description, for a shotgun is a weapon that scatters its fire and is distinguished by the feature that one of its many missiles may find the mark. But is the shotgun, with its scattering, diffuse effect, the best and most economical weapon with which to attack a specific quarry? Or aren't we obliged to seek some more precise, more effective weapon if we hope to meet and conquer a specific problem? I think that the very preciseness, the very sensitivity of the techniques we have used in the past have contributed most to whatever success we have met. Let me illustrate by one example from the field of infectious diseases. We have been able virtually to conquer diphtheria by pinning down our immunization procedures and thus getting the best results. There was no need to immunize everyone to control the disease, we discovered, but only the pre-school child and the very young. By narrowing down our techniques and control measures, we were able, in this country, to solve the problem not only most effectively but also most economically.

There are many significant differences between screening for the chronic diseases and for diseases like tuberculosis and venereal disease. The most important, of course, center around the communicable nature of the latter as contrasted with the noncommunicable characteristics of the former. A one-time case-finding campaign for diseases like cancer, heart disease, or diabetes, even if 100 percent effective, has almost no effect on the number of new cases which will occur next month, next year, or in any following period. This contrasts sharply with effective screening, plus diagnosis and treatment, of venereal diseases and tuberculosis where every case found and put under surveillance removes a source of potential infection from the population.

It is this aspect of communicable disease control, in fact, that has given public health agencies widespread and complete recognition in this field. As yet, public health does not have this recognition with respect to the major chronic diseases. I do not mean to imply that this social acceptance will not come in time or that we must therefore neglect the tremendous challenge of chronic disease as a public health problem. But I do think that the wisdom of tying these separate sets of programs together at the present time, through the exclusive medium of multiple screening, has serious implications for specific programs.

We might sum up by considering the major elements that have made case-finding programs for venereal diseases and for tuberculosis effective. There are, I think, four: (1) a specific and relatively simple test; (2) in the case of syphilis, a very effective remedy and, in the case of tuberculosis, a relative adequacy of facilities for treatment, as contrasted with the chronic diseases; (3) a body of administrative and technical experience, which has developed over a long period of years; and (4) community acceptance and recognition of the primacy of public health authorities in these fields, based on the fact that every case of tuberculosis and venereal disease which is found helps prevent the development of a new one.

Multiple screening for the chronic diseases as yet meets none of these prerequisites. The tests have not been thoroughly validated nor are they as sensitive as they should be. The machinery for long-term treatment and care of the victims of chronic disease has not been adequately developed. Health departments have only a limited experience in the field of chronic disease control. And finally, health departments lack the budgets and a clear expression of community recognition of the health department's role in chronic disease control. All these will come in due course if we proceed gradually, making sure of our ground as we go.

We must bear in mind that we are much further along in venereal disease control, for example, than in any other program. We are reaching the point, in fact, where it is possible to speak not only of syphilis control but of the eradication of syphilis. This kind of victory, which has been won against a number of the communicable diseases, is after all the kind of accomplishment to which we in public health can point with greatest pride. Although we must now address ourselves to the larger problems of chronic ailments and adult hygiene in general, I hope, in our zeal to open up these new fields, we will not sacrifice the gains we have already made. While we might incorporate as many of the new tests as possible in connection with our case-finding campaigns for syphilis and tuberculosis, we should do so without losing sight of the primary objectives—eradicating these two diseases.

We must remember, too, that we have been battling the venereal diseases for 30 years and only now is victory over syphilis in sight. While the experience and technical knowledge we have gained in venereal disease control should help us achieve a speedier control of the chronic diseases than would otherwise be possible, there is no reason to expect any overnight miracles. In fact, control of such diseases as cancer, heart disease, and diabetes, with their important economic and social implications and their long-term nature, will probably face as long and uphill a fight as did the control of syphilis. Thus, multiple screening for the chronic diseases has a long, hard row ahead of it. It would be a mistake, in my opinion, to slow down the venereal disease program to that pace, or to lose the precision, or sacrifice the progress we have made. The same, of course, holds true for the tuberculosis control program.

Despite these reservations, I think there is a sound future ahead for multiple screening. The advantages of its broad appeal and its bright promise cannot be denied. If pursued too rapidly, multiple screening can retard the progress of already established public health programs. If it is developed carefully, with due caution and safeguards and with proper study and analysis, most of the misgivings of its critics should disappear. Only then can it become an important member of the public health family and contribute to higher levels of individual and community health.

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National Conference on Aging

By Clark Tibbitts*

More than 800 delegates met at the Shoreham Hotel in Washington, D. C., August 13–15, 1950, to explore the various factors in aging that have implications for the Nation; for States, localities, and families; and for the aging and aged themselves. The delegates assembled without prepared papers and with only tentative agenda for their intensive consideration of the manifold and complex problems of our progressively lengthened life span and our progressively curtailed span of working years. They came mainly to pool their observations, experience, knowledge, and suggestions for action and to return to their individual spheres of work equipped to apply the ideas and plans that developed through group discussion of varied approaches to similar or related problems.

Three main purposes in calling the Conference were (1) to identify, and obtain the cooperation of, leaders in all fields of social endeavor—education, employment, health, welfare, community planning, religion, and family life; (2) to enable participants to share their experience and knowledge and to develop methods for teamwork in services for the aging and aged; and (3) to provide means for later comprehensive and continuing action throughout the United States assuring national, local, and individual opportunities which preserve and strengthen the relatively untapped potential resources of health, productivity, and happiness within the older age groups of the population.

The mechanisms through which these purposes were approached deserve brief description to indicate the methods of bringing together the Nation's experts in many fields to focus on a problem that touches all phases of individual and social activity. The paragraphs that follow, therefore, outline the steps taken in the planning stage of the Conference, provide a brief summary of the principles developed in the discussions, and indicate the basis for hope that a start toward community action will be made throughout the Nation.

The Planning Stage

Early in 1948, the Federal Security Agency set up a Working Committee on Aging which included representatives of its major constituent units—the Public Health Service, the Social Security Administration, the Office of Education, and the Office of Vocational Rehabilitation. This action followed the recommendations of the National Health Assembly which had pointed out the need for consideration of the complex problems of aging that are related to, but actually distinct from, the problems of chronic illness. The Working Committee, with the aid of consultants, prepared and issued a report of its survey of the problems of aging. The response to that report from the several hundred persons who reviewed it, and requests from many others who recognized the need for Nation-wide consideration of the situation which confronts all States and localities led to plans for setting up a national exploratory forum on aging. The President, in a letter to the Federal Security Administrator, added his voice to the other appeals, requesting a prompt assessment of the implications of the increasing proportion of the aged in the population.

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Though many individuals and groups in the United States had given intensive study to some aspects of aging—medical, economic, social, or philosophical—there were few who had approached the subject from all angles and who recognized the many ramifications of the problem. Identifying the people who know most about the needs of the aged in their separate fields and giving them an opportunity to talk together seemed important first steps in viewing the problem as a whole. A file of some 2,000 names of people who have been pioneers in stressing one or more problems of aging was built up. From among them certain leaders consented to assume responsibility for planning the Conference and for selecting the persons who would contribute most to the group discussions and profit most from the opportunity to learn what others thought, planned, and did about the problem of aging in other fields of activity.

Planning committees were composed solely of non-Federal experts to assure a broad representation of all parts of the country and all possible spheres of interest. Eleven such planning units were set up for:

IA. Our aging population and research in its biological, medical, psychological, and sociological aspects.
IB. Population changes and economic implications.
II. Employment, employability, and rehabilitation.
III. Income maintenance.
IV. Health maintenance and rehabilitation.
V. Education for an aging population.
VI. Family life, living arrangements, and housing.
VII. Creative and recreational activities.
VIII. Religious programs and services.
IX. Community organization.
X. Professional personnel.

Sections IA and IB, originally a unit, were split into the two separate parts as planning developed the need for special concentration on research.

Each planning committee was assisted by a previously established special secretariat which handled the mechanics and clerical work involved in identifying potential delegates. The secretariat arranged for meetings of planning committees, wrote and distributed minutes of the meetings, and assembled background material.

The secretariats included representatives of several Federal offices in addition to the Federal Security Agency—the Departments of Labor, Commerce, Agriculture, and Interior, the Housing and Home Finance Agency, and the Veterans' Administration. Later, at the request of the planning committees, some 40 Federal employees were invited to participate as delegates because of the contributions they could make as individuals rather than as representatives of the departments in which they work.

The Conference Itself

Except for a luncheon meeting at the beginning of the Conference, a dinner meeting at the end of the first day's work, and a luncheon meeting which preceded the close of the assembly, the delegates met as separate sections in working sessions. These sections also followed the general plan of having preliminary, interim, and final sessions for all section members, but their major work was carried on by small subsections which explored specific aspects of the subject assigned to the section for consideration. Each section thus repeated in miniature the processes of the Conference as a whole, and each consisted of representatives of all broad fields of occupation and activity represented within the Conference. It was believed, and subsequently proved, that greater cross-fertilization of experience and knowledge and more effective patterns of subsequent teamwork would result from having each section and subsection reflect the entire Conference in composition and operation.

Both advantages and disadvantages are to be found in this approach. Meetings of large numbers of people from various fields of activity, each person equipped to throw light on some particular phase of the problems of aging, could not hope to draw up specifications or produce blueprints for comprehensive and integrated programs for the aging. On the other hand, if each section had considered only the role of some one professional group or one form of activity in improving the welfare of the aging and aged, plans for action might have been specific but would probably have lacked adequate recognition of other services and other groups in work with the aged.

Putting first things first, it seemed essential to identify the problems of the aged, measure the dimensions of those problems, and see their implications for every phase of life and activity in the United States. This experiment in group dynamics will, of course, have to prove its value later in the extent to which groups of educators, health personnel, employment counsellors, insurance experts, social workers, clergy, housing administrators, and other professions represented, recognize in their own professional groups the contribution they can make to the welfare of the aged and work with others in their community to develop plans for action that will take account of the principles and purposes developed in the Conference.

Principles Developed

Editorial committees, appointed by the delegates for each section, are preparing final reports of the work of their groups for publication in a volume for the Conference as a whole. Until these individual reports are completed and approved for each section, it is premature to give any details on the results of each section's work. Certain general statements presented by the section chairmen at the final meeting of the Conference can serve, however, to indicate the general principles and direction of discussion that characterized the forum.

The situation posed by the increasing numbers and proportions of older people in the population was recognized as so critical that the problems of aging require simultaneous and immediate attention of many groups and interests in the Nation. By 1975, our population will contain some 20 million people aged 65 or over. The decline in the birth rate over the past century is mainly responsible for the growing proportion of aged persons in the population. Improvement in health and medical care has been a contributing, though a secondary factor, but its importance with advancing medical knowledge and technique may well increase.

Technological changes, shifts in demands for labor in certain types of occupations, declining opportunities for self-employment, current employment practices, and compulsory retirement programs have lessened the chances for older people to earn their living. Only 45 percent of the men aged 65 or over are now in the labor force as compared with 68 percent in 1890.

Many delegates considered that continuing employment of older workers is essential to provide adequate financial support of the aged themselves and to meet the production needs of the country as a whole. Basic research is advocated to determine the employability of older workers, the advantages of a flexible retirement age, and the possibility of general adjustment of labor, management, and community planning to meet the economic implications of the diminishing ratio of young workers to their aged dependents.

As individuals, older persons have all the fundamental needs and desires of human beings of other age groups. As in the past, satisfaction of those needs must and should continue to be mainly a product of individual effort. That effort, however, is of little avail unless it can be exerted in a favorable environment. Aging affects not only the individual, but also his family, his community, and society as a whole. The hope of improving the environment for the aged themselves, and, in turn, the environment they create for others, rests in accumulation of wider knowledge, understanding, and acceptance of the aging process. Among the measures recognized as essential are greater effort and success in maintaining the health and functional capacity of older people and in furthering their opportunities for satisfactory living arrangements. The aged should not be considered a separate problem or population group. They should be able to maintain active participation in family and community life and satisfactory and satisfying use of leisure. A large part of the problem can be solved by promoting among the aging adequate mental, emotional, and spiritual adjustment to changes in all age groups throughout the life cycle of growth and development.

Education for aging must start early and should encompass the whole gamut of human needs and activities. Personnel who work with the aged should have clearer understanding of the needs of the aged and of the challenge and opportunities for positive achievements in helping the aged maintain satisfying and productive roles in their relations with other age groups and the community as a whole. Communities should make greater efforts to discover the needs of the aged, to foster more constructive attitudes toward the problems of aging, and to develop techniques and facilities for constructive services for and with the aged.

Results in Light of Objectives

Within its specific and clearly limited objectives, the National Conference on Aging achieved notable success, if that success can be measured by the enthusiastic participation of delegates, tireless and constructive efforts of the planning committees and their secretariats, and letters and comments on its organization and procedures. The six objectives, as defined for the program were to:

1. Provide a forum for persons concerned with aging.
2. Revaluate the potentialities of older people toward ensuring their useful and satisfying participation in the life of the community.
3. Stimulate the exchange of ideas among persons of varied experience, with a view to solving problems of the aging through voluntary and public organizations in each State, city, and community.
4. Define the nature and extent of these problems as they affect the individual, his family, his community.

5. Promote research on aging in such fields as employment, health, education, recreation, rehabilitation, and social and psychological adjustment.

6. Transmit the findings of this Conference to interested groups, including the Federal Government, as guide lines for developing policies with regard to our older people.

Only the first four of those objectives could be accomplished within the time span of the Conference itself. The fifth will perhaps be furthered when the sixth is achieved through publication of the detailed reports of the sections as a synthesis of a Nation-wide evaluation of what the aging need and what can be done to clarify and meet those needs.

If the enthusiasm and interest created by the Conference bear fruit in each community from which the delegates were drawn, important steps seem assured in approaching the aims carried on the masthead of the Journal of Gerontology, "To add life to years, not just years to life."

Incidence of Disease

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

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UNITED STATES

Reports From States for Week Ended September 30, 1950

New cases of acute poliomyelitis reported in the United States during the current week numbered 1,994, an 8 percent decrease from the 2,170 cases reported for the preceding week. This is the first week since May 20 that a decrease has been reported from the preceding week. The figure for this week is higher than the corresponding number (1,852) for 1949. The week of peak incidence of this disease to date occurred last week, the latest week in any year during the past 20 years, with the exception of 1932.

The cumulative total number of reported cases of poliomyelitis (20,405) for the current "disease" year was below the corresponding total (32,204) for last year, the highest on record. The "disease" year for acute poliomyelitis begins with the twelfth week of the calendar

Comparative Data for Cases of Specified Reportable Diseases: United States

[Numbers under diseases are International List numbers, 1948 revision]

Disease	Total for week ended		5-year median 1945–49	Seasonal low week	Cumulative total since seasonal low week		5-year median 1944–45 through 1948–49	Cumulative total for calendar year		5-year median 1945–49
	Sept. 30, 1950	Oct. 1, 1949			1949–50	1948–49		1950	1949	
Anthrax (062)	1	1	(1)	(1)	(1)	(1)	(1)	33	41	(1)
Diphtheria (055)	131	197	289	27th	1,021	1,499	1,933	4,149	5,267	8,230
Acute infectious encephalitis (082)	28	44	32	(1)	(1)	(1)	(1)	707	577	483
Influenza (480–483)	1,282	1,019	1,111	30th	7,852	5,827	5,827	254,111	81,694	146,798
Measles (085)	667	509	612	35th	2,225	1,886	2,178	290,396	590,404	554,446
Meningoccal meningitis (057.0)	62	54	54	37th	113	102	102	2,912	2,618	2,727
Pneumonia (490–493)	689	969	--------	(1)	(1)	(1)	(1)	64,856	60,700	--------
Acute poliomyelitis (080)	1,994	1,852	1,296	11th	[2]20,405	32,204	18,035	[2]21,537	33,119	18,502
Rocky Mountain spotted fever (104)	1	10	10	(1)	(1)	(1)	(1)	[3]422	531	505
Scarlet fever (050)	474	586	675	32d	2,331	2,366	3,048	42,501	60,032	65,151
Smallpox (084)	--------	--------	--------	35th	--------	2	4	26	43	149
Tularemia (059)	13	13	13	(1)	(1)	(1)	(1)	734	918	763
Typhoid and paratyphoid fever (040, 041) [4]	90	109	111	11th	2,168	2,596	2,596	2,678	3,084	3,084
Whooping cough (056)	1,630	1,421	1,728	39th	118,731	56,635	101,893	97,195	46,602	75,875

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[1] Not computed. [2] Deduction: Alabama, weeks ended Jan. 28 and Feb. 25, 1 case each; Georgia, weeks ended Sept. 16 and 23, 1 case each. Addition, Indiana week ended Sept. 16, 10 cases. [3] Addition: Arkansas, week ended Sept. 16, 1 case. [4] Including cases reported as salmonellosis.

year; the cumulative total for the calendar year was 21,537, compared with the total of 33,119 for the corresponding period last year.

For the current week, reported cases of acute poliomyelitis in 5 of the total of 9 geographic divisions decreased from the preceding week. These decreases ranged from 81 (290 to 209) cases reported in the West North Central States to 4 (99 to 95) in the New England States. The increase in 3 other divisions was small, with the Middle Atlantic States showing no change.

For the current week, the States reporting the largest numbers of cases of acute poliomyelitis were: New York (331), Ohio (159), Michigan (152), Illinois (130), Pennsylvania (118), and Texas (92).

Alaska reported 11 cases of acute poliomyelitis, compared with 3 last week. The cumulative total for the calendar year was 15.

The total number of cases of infectious encephalitis reported for the week was 28 compared with 44 for the corresponding period last year. For the calendar year, a total of 707 cases was reported, the highest number in the past 5 years.

The total number of cases of whooping cough reported during the current week concludes the "disease" year with a total of 118,731. The "disease" year begins with the fortieth week in each calendar year for reported cases of whooping cough. The largest total number of cases reported for any year in the past 5 "disease" years was 146,266.

One case of anthrax was reported in Pennsylvania and no smallpox was reported in the United States. Of 37 States and the District of Columbia reporting on rabies in animals, 22 States and the District of Columbia reported no cases. The remaining 15 States reported 100 cases with the largest numbers reported in Iowa (26), New York (15), and Texas (11).

Deaths During Week Ended September 30, 1950

	Week ended September 30, 1950	*Corresponding week, 1949*
Data for 94 large cities of the United States:		
Total deaths	8, 877	8, 482
Median for 3 prior years	8, 544	----------
Total deaths, first 39 weeks of year	357, 760	357, 805
Deaths under 1 year of age	641	680
Median for 3 prior years	685	----------
Deaths under 1 year of age, first 39 weeks of year	24, 215	25, 537
Data from industrial insurance companies:		
Policies in force	69, 560, 555	70, 132, 584
Number of death claims	11, 442	11, 844
Death claims per 1,000 policies in force, annual rate	8. 6	8. 8
Death claims per 1,000 policies, first 39 weeks of year, annual rate	9. 3	9. 2

Reported Cases of Selected Communicable Diseases: United States, Week Ended September 30, 1950

[Numbers under diseases are International List numbers, 1948 revision]

Area	Diphtheria (055)	Encephalitis, infectious (082)	Influenza (480–483)	Measles (085)	Meningitis, meningococcal (057.0)	Pneumonia (490–493)	Poliomyelitis (080)
United States	**131**	**28**	**1,282**	**667**	**62**	**689**	**1,994**
New England	----------	----------	**2**	**40**	**4**	**20**	**95**
Maine	----------	----------	----------	1	----------	6	13
New Hampshire	----------	----------	2	----------	----------	----------	6
Vermont	----------	----------	----------	3	----------	----------	1
Massachusetts	----------	----------	----------	22	3	----------	40
Rhode Island	----------	----------	----------	4	----------	2	4
Connecticut	----------	----------	----------	10	1	12	31
Middle Atlantic	**11**	**4**	**2**	**134**	**10**	**173**	**517**
New York	7	3	(1)	56	4	127	331
New Jersey	----------	----------	2	39	----------	18	68
Pennsylvania	4	1	----------	39	6	28	118
East North Central	**2**	**1**	**17**	**139**	**11**	**55**	**548**
Ohio	----------	----------	----------	10	2	----------	159
Indiana	1	----------	3	6	----------	3	46
Illinois	----------	1	----------	33	6	38	130
Michigan	1	----------	----------	13	1	13	152
Wisconsin	----------	----------	14	77	2	1	61
West North Central	**7**	**2**	**1**	**22**	**10**	**25**	**209**
Minnesota	3	----------	1	4	3	2	32
Iowa	1	----------	----------	1	1	----------	86
Missouri	----------	----------	----------	5	----------	6	28
North Dakota	----------	----------	----------	----------	3	11	----------
South Dakota	----------	----------	----------	4	1	----------	10
Nebraska	----------	----------	----------	2	----------	1	26
Kansas	3	2	----------	6	2	5	27
South Atlantic	**62**	**1**	**220**	**33**	**11**	**79**	**246**
Delaware	----------	----------	----------	6	----------	----------	3
Maryland	----------	----------	----------	4	1	16	47
District of Columbia	----------	----------	----------	----------	2	13	14
Virginia	2	----------	164	7	1	27	61
West Virginia	9	----------	34	5	1	2	29
North Carolina	31	----------	----------	5	3	----------	41
South Carolina	6	----------	16	1	3	3	13
Georgia	11	1	4	4	----------	7	26
Florida	3	----------	2	1	----------	11	12
East South Central	**17**	**3**	**38**	**46**	**6**	**20**	**71**
Kentucky	5	----------	----------	26	2	6	30
Tennessee	1	2	17	14	----------	----------	28
Alabama	3	1	18	----------	3	6	6
Mississippi	8	----------	3	6	1	8	7
West South Central	**20**	**3**	**889**	**92**	**6**	**226**	**138**
Arkansas	4	----------	46	9	----------	10	16
Louisiana	1	----------	1	----------	----------	10	12
Oklahoma	2	----------	23	4	----------	11	18
Texas	13	3	819	79	6	195	92
Mountain	**11**	**1**	**96**	**56**	**2**	**29**	**38**
Montana	2	----------	11	13	----------	----------	2
Idaho	1	----------	14	8	----------	----------	13
Wyoming	----------	----------	----------	----------	----------	2	----------
Colorado	----------	----------	10	6	----------	14	6
New Mexico	1	----------	----------	1	1	10	3
Arizona	7	1	61	2	1	3	5
Utah	----------	----------	----------	26	----------	----------	9
Nevada	----------	----------	----------	----------	----------	----------	----------
Pacific	**1**	**13**	**17**	**105**	**2**	**62**	**132**
Washington	----------	----------	14	31	----------	1	41
Oregon	----------	----------	1	13	1	8	26
California	1	13	2	61	1	53	65
Alaska	----------	----------	5	----------	----------	----------	----------
Hawaii	----------	----------	6	3	----------	----------	----------

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[1] New York City only.

Anthrax: Pennsylvania, 1 case.

JAMAICA

Reported Cases of Certain Diseases—4 Weeks Ended Aug. 26, 1950

Disease	Kingston [1]	Other localities [1]	Total
Chickenpox	6	7	17
Diphtheria	5	3	9
Erysipelas		1	1
Leprosy	1	4	6
Ophthalmia neonatorum		1	1
Poliomyelitis	1	1	3
Scarlet fever		1	1
Tuberculosis, pulmonary	32	42	87
Typhoid fever	5	38	57
Typhus fever (murine)	2		3

[1] Figures given for "Kingston" and "Other localities" separately are for the 3 weeks ended Aug. 5, 12, and 26. Report giving these figures for week ended Aug. 19 not received.

NEW ZEALAND

Reported Cases of Certain Diseases and Deaths—4 Weeks Ended June 24, 1950, 5 Weeks Ended July 29, 1950, and 4 Weeks Ended August 26, 1950

Disease	4 weeks ended June 24, 1950		5 weeks ended July 29, 1950		4 weeks ended Aug. 26, 1950	
	Cases	Deaths	Cases	Deaths	Cases	Deaths
Actinomycosis			1		1	
Brucellosis	4		6		3	
Diphtheria	10		13		9	
Dysentery:						
Amebic	1		4		6	
Bacillary	10		23		9	
Erysipelas	10		11		14	
Food poisoning	40		3		2	
Influenza					1	1
Meningitis, meningococcal	6		16		15	
Ophthalmia neonatorum	1		1			
Poliomyelitis	7		11		3	
Puerperal fever	6		3		1	
Scarlet fever	101		127		69	
Tetanus	1	1	1		3	
Trachoma					1	
Tuberculosis (all forms)	153	41	202	48	201	54
Typhoid fever	11	1	6	1	5	

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

Burma. During August 1950, five cases of cholera (one fatal) were reported in the port of Rangoon.

India. A decided increase in the reported incidence of cholera has been noted in Madras since the week ended August 19, when 5 imported cases were reported. Reports by weeks since that date are as follows: Weeks ended—August 26, 6 cases; September 2, 11 cases; September 9, 17 cases; September 16, 27 cases; September 23, 39 cases.

India (French). During the week ended September 9, 1950, 27 cases of cholera were reported in Pondicherry.

Plague

Belgian Congo. During the week ended September 23, 1950, one fatal case of pneumonic plague was reported in Stanleyville Province, at Wasa, northeast of Blukwa.

China. Plague has been reported in Kwangtung Province as follows: March 1–31, 1950, 141 cases, 71 deaths; April 1–30, 169 cases, 61 deaths; May 1–31, 69 cases, 10 deaths.

Union of South Africa. On August 31, 1950, one fatal case of plague was reported at Fauresmith, Orange Free State. This is a new focus of the disease in Orange Free State.

Smallpox

Belgian Congo. A mild form of epidemic smallpox has been reported in Leopoldville Province, Belgian Congo since the first of July. In Belgian Congo during July, 503 cases were reported, and 787 cases during August. Reports for September are as follows: Weeks ended—September 2, 117 cases; September 9, 170 cases; September 16, 245 cases. The highest reported incidence has been in Leopold, Lusambo, and Stanleyville Provinces.

British East Africa. According to reports recently received the incidence of smallpox in Tanganyika has apparently been high throughout the current year. Up to July 1, 1,955 cases had been reported. During July 770 cases (138 deaths) were reported including 100 cases, 15 deaths, delayed reports from the previous period. The recorded incidence for week ended August 5 was 99 cases, with 5 deaths. The majority of cases reported have occurred in Southern Province. Small numbers of cases have been reported in the port cities of Lindi and Minkindani.

Indonesia. Reported incidence of smallpox continues high in Surabaya, Java, where 155 cases were reported for the week ended September 16. During the week ended September 9, 38 cases were reported in Bandjermasin, Borneo.

Regular Corps Examination for Psychologists

Examinations for scientists (psychologist) in the Regular Commissioned Corps of the Public Health Service will be held December 11, 12, and 13 in various cities throughout the country. Completed applications must be in the Washington office by November 13.

Appointments are permanent and provide opportunities for career service in clinical psychology and research. Benefits include periodic pay raises and promotions; liberal retirement provision; medical care; annual and sick leave.

Appointments will be made in the grades of assistant and senior assistant, equivalent to Army ranks of first lieutenant and captain, respectively. Entrance pay is $4,486.56 for assistant (with dependents) and $5,346 for senior assistant (with dependents), including rental and subsistence allowance. Applicants must expect to receive the doctor's degree in psychology no later than September 1951.

The written professional examination will place proportionately greater emphasis on clinical psychology. Other areas of psychology, such as developmental, social, experimental, physiological, historical and theoretical, tests and measurements, etc., deemed appropriate to the training and experience of the post doctorate will be included. Some background may be required in the sciences relevant to psychology.

For application forms and additional information write to Surgeon General, Public Health Service, Federal Security Agency, Washington 25, D. C., Attention: Division of Commissioned Officers.

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, Public Health Service, Washington 25, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington 25, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

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PUBLIC HEALTH SERVICE

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Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
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Division of Public Health Methods
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Public Health Reports

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Rural Health Cooperatives

By Helen L. Johnston, B.A.*

Many families on farms and in small towns find that they live at the far end of the road when they look for health services. The more rural a county's population, the fewer doctors, dentists, and hospitals it is likely to have. In some areas, of course, families on farms and in small towns live close to cities and can reach city doctors and hospitals quickly and conveniently. Two-thirds of the counties in the United States, however, are far removed from metropolitan centers. The services received by families living in these isolated counties are likely to be limited to those they can obtain locally (*1* pp. 1–2).

Groups of persons in some rural communities have been looking into local shortages of doctors and hospital beds. Some have made a diagnosis of their community health needs based on a rather careful investigation. Others have based their diagnosis on a more superficial examination. Just as they have diagnosed their need, so in some areas men and women from farms and small towns are planning and carrying out their own prescriptions to meet that need. Among other measures, they are prescribing cooperative associations to obtain for themselves and their communities health services they cannot get by working individually.

Definition

Cooperatives are self-help organizations, formed voluntarily on a nonprofit basis by groups of people wishing to meet a common need. Ownership and control rest equally with all members. The members set the goals and determine general policies. They elect a board of directors which, in turn, employs a manager who carries out the association's policies and conducts its affairs under the board's general supervision. Each member is entitled to one vote in electing directors and deciding other questions coming before the membership.

Rural people have been applying cooperative principles and methods, developed through formally organized associations, to the solution of a variety of rural problems for more than 100 years. They have only recently started prescribing the use of these principles and methods to help meet their health problems.

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*Medical Economics Branch, Division of Medical and Hospital Resources, Bureau of Medical Services, Public Health Service

Objectives

Rural health cooperatives usually have two major objectives. First, they want to bridge the gap—in terms of miles to be travelled—between local families and needed health services. To meet this objective, they usually plan local health service centers, staffed by one or more doctors. Their second objective, as a rule, is to bridge the gap—in terms of cost—between local services and the people who need them. For this purpose, they develop prepayment plans to help local families budget the costs of health services and thereby use them more effectively. A further reason underlying the prepayment plans is the wish to provide regular support for local health services.

Over-all Record

Available records show that 101 rural health cooperatives had been formed by mid-1949. The oldest was organized in 1929. Eighty-six were formed after January 1945.

The cooperatives were scattered in small communities in 21 States, nearly all west of the Mississippi. Most of them were formed in predominantly rural areas. All but 18 established headquarters in communities of less than 2,500.

Table 1 shows the status of 93 of the 101 groups on record in mid-1949. At that time a little more than half—54 associations—were operating health service centers, with or without a prepayment plan, or were taking steps to establish their own local centers. More than one-third—39 associations—had become inactive or had disbanded.

Some inactive groups had their plans halted by local problems that proved impossible to solve at the time. In at least a few cases, changes in the local situation eventually may enable some groups to revive their plans. Only six disbanded groups ever operated a health service center. In several cases, the group had to close its center when the one doctor on whom it had depended left the community and the group was unable to find another doctor willing to participate.

Several groups now operating a health service center without a local prepayment plan reported that people in their area had been interested chiefly in obtaining local services rather than in developing and operating a prepayment plan. Several others, however, had originally planned to offer prepaid services and abandoned this plan only when it seemed unlikely that they could get medical cooperation on any other basis.

Membership figures were available for about two-thirds of the 101 associations. Nearly all had a rather small membership. Only three

Table 1. *Rural health cooperatives of record, number and current status, by States, 1949*

State	Associations of record	Current status				
		Operating with prepayment [1]	Operating without prepayment [2]	In process of organizing, raising funds, or building	Inactive or disbanded [3]	Unknown
Arizona	1					1
Colorado	2	1	1			
Idaho	4			1	3	
Indiana	1				1	
Iowa	2			1	1	
Kansas	2	1		1		
Michigan	1					1
Minnesota	7		2	4	1	
Missouri	1				1	
Nebraska	3			1	2	
New Mexico	2			1		1
North Carolina	1	1				
North Dakota	3			2	1	
Oklahoma	3	3				
Oregon	4	1		1	2	
South Dakota	1	1				
Tennessee	1	1				
Texas	52	13	8	5	21	5
Utah	2	1			1	
Washington	4			1	3	
Wisconsin	4	1		1	2	
Total	101	24	11	19	39	8

[1] Includes one association nearly ready to operate at the time information was obtained.

[2] One association was also raising money for a new health service center through which it planned to offer prepaid services.

[3] Six of the inactive or disbanded associations offered prepaid health services for at least a short period before closing. One additional group sold its health service center to a doctor. In several areas an effort to secure a county bond issue to build a hospital had been substituted for the cooperative project. Some groups never went beyond the initial planning stage. Possible changes in the local situation eventually may enable some to revive their plans.

had more than 1,000 member families. These included two operating with their own prepayment plans and one still in the process of setting up a health service center. Of the other 43 active associations reporting membership, 30 had less than 500 member families. Of 15 inactive or disbanded groups for which reports were available for membership at the peak of operation or at the time of disbanding, 12 had less than 500 member families.

Study

The over-all record, which shows that more than a third of the groups organized have given up their plans or disbanded entirely, indicates to some extent the difficulties cooperatives face. To help groups in widely scattered rural communities benefit from each other's experience, as well as to answer questions many people have been asking about health cooperatives and their purposes and methods, a study of rural health cooperatives was started in August 1948.[1] Forty-eight groups were selected to show the experience of rural health cooperatives in various stages of development. The 48 groups include:

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[1] The study was started under the direction of the Farm Credit Administration in the U. S. Department of Agriculture and completed under the direction of the Public Health Service. The complete findings of the study are presented in a report, Rural Health Cooperatives, which will be released soon as a joint publication of the two agencies. This article reviews salient features of the longer report.

19 operating health service centers through which prepaid services were provided dues-paying members (all but two provided prepaid medical care in the doctor's office, a practice typical of cooperative prepayment plans);
6 operating health service centers without a prepayment plan;
6 in the process of organizing, raising funds, or building;
17 that had given up after a short period of operation or had abandoned their plans but never operated.

Excluded from the study were all groups with a predominantly urban membership, organizations providing benefits in cash rather than in service, health plans supervised by the Farm Security Administration, and organizations formed primarily as units for enrolling rural people in a Blue Cross, Blue Shield, or other type of prepayment plan in which subscribers have only an indirect voice, if any, in determining the policies of the plan.

Visits were made during 1948 and 1949 to more than 40 organizations in 10 States. Information obtained through field visits was supplemented by correspondence with the groups visited and with other groups, as well as by review of organization papers and other material.

Areas Where 48 Groups Organized

All but 6 of the 48 cooperatives studied were organized in counties where at least half the people live on farms or in small towns. Most were formed in areas having not more than 6 or 8 families to each square mile. Only 7 were set up in rather poor areas. The rest were organized in counties with a rural level of living approximating, or above, the average for the country as a whole (*2*, *3*).

Thirty-eight of the 48 associations were formed in predominantly rural counties located at a considerable distance from any large city. For this reason, the services within the borders of their counties in general are a fairly reliable measure of the services conveniently accessible to families living within their areas.

In most counties where rural health cooperatives were formed, local health services were deficient measured by ratios of doctors and hospital beds to population generally considered acceptable. Three of the counties had no doctor in 1946. Twelve additional counties had more than 3,000 persons for every practicing physician. Twenty had from 1,500 to 3,000 persons for each doctor. Eight counties had no general hospital at the time a cooperative was formed. Fifteen others had less than 2½ beds for every 1,000 persons (*2*; *1*, table 6).

Development

Rural health cooperatives developed out of local recognition of need for more adequate local health services. The idea usually was introduced by someone acquainted with an existing health cooperative.

Sometimes it was suggested by a local farmer or cooperative leader. Just as often it was suggested by a local editor or other businessman.

Interest was stimulated and community support was built up through informal discussions among small groups, discussions at meetings of various local organizations, and community-wide meetings called to explore the possibilities of a health cooperative as a way to meet local health needs. After substantial community support was indicated, several local leaders usually took steps to incorporate.

In many States, groups proposing to form a health cooperative find there is no law on the statute books especially adapted to their needs (*4*). Laws applying to agricultural cooperatives usually are not broad enough to permit formation of a health cooperative. Laws providing for prepayment medical service plans, in general, are so written that development of these plans is left almost entirely to doctors. In a few States, including Texas and Wisconsin, a group can incorporate under special laws providing for cooperative associations sponsored by users of health services. In other States, most of the associations reporting the law under which they incorporated indicated that it was the charitable and benevolent or the nonprofit corporation law.

Membership

When the hurdle of incorporation has been surmounted, the groups start building membership in earnest. They usually place few restrictions on membership. Any individual or family may apply for a membership certificate. The certificate covers all members of a family including the father, mother, and all unmarried children living at home. Family dependents living under the same roof also are covered, as a rule.

The purchase price of a membership certificate represents the investment a family is required to make in a cooperative's facilities and equipment in order to qualify for membership. Except for a few associations, the amount ranges from $50 to $100. A member must also agree to abide by the association's articles and bylaws.

Usually membership applications are subject to approval by the board of directors. In addition some groups require a signed statement by an applicant concerning his own health and that of his dependents. Several reported that they require a physical examination of all applicants for membership or reserve the right to require such an examination after they open their health service center.

In general, the membership of a rural health cooperative is concentrated within a rather short distance of the association's headquarters. According to the reports of 23 active groups, at least half their member families live within 25 miles of their service center. Nineteen of these 23 groups reported that at least half live within

10 miles. Nearly all groups, however, stated that some member families live at distances of 50 miles or more.

Most associations draw members not only from the county in which they have headquarters but also from one or more adjoining counties. In isolated counties, however, the total population of the county in which a cooperative has its headquarters might be used as a rough measure of the total number of persons eligible for membership and likely to be interested in joining a rural health cooperative. In general, the more rural counties seemed to have a larger proportion of their residents included in a cooperative's membership than did other counties. Twelve out of 25 associations operating in isolated rural counties had headquarters in counties with no incorporated place of 2,500 or more. These 12 groups reported a membership equal to about 20 persons for every 100 residents in their counties. Thirteen associations operating in isolated semirural counties having at least one town of 2,500 or more, on the other hand, reported memberships equaling only about 8 to every 100 county residents.

Health Service Centers and Medical Staff

Twenty-five of the cooperatives studied were operating health service centers and six others were building or planning such centers in mid-1949. Twenty-two centers were built or remodelled by the group itself and are owned by the cooperative. Two operate centers which are publicly owned. One rents office quarters for a doctor.

Typically, the centers combined doctors' offices and hospital beds under one roof. Two, however, have clinics and two have buildings designed for hospital purposes only. The bed capacity of the centers with hospital facilities ranges from 10 to 100. Only two have more than 50 beds. Twelve reported less than 25 beds each.

Eight associations reported one doctor each; nine had two doctors; three had three doctors; and one had nine. In addition, two had one dentist each and one had two dentists. The two that did not provide office space for doctors in their service center had no doctors directly associated with the cooperative. No information was obtained for the number of doctors associated with two additional groups.

The 17 associations with prepayment plans providing medical care are the only ones having definite agreements with their doctors. Under the terms of their agreements the associations invariably assume responsibility for providing their doctors with equipment and a place in which to work. Most groups pay their doctors a regular monthly salary, in some cases with arrangements for a bonus payable out of net operating income at the end of the year. Other terms in the agreements of one or more associations include: permission to the doctor to retain fees for home calls, at least for those made outside office hours; rotation of service on weekends; paid vacations; and rent-free living quarters.

Noninterference in Professional Matters

Health cooperatives themselves, of course, do not engage in medical practice nor do they attempt to dictate how it shall be carried on. The members and their elected boards of directors confine their interests to business aspects of the associations. They arrange with doctors for professional services and rely on those doctors for the conduct of all professional affairs.

The bylaws of health cooperatives often include safeguards against lay interference in professional matters or in the professional relationship between doctor and patient. Such a provision is recommended for all its member health groups by the Cooperative Health Federation of America, a national organization of lay-sponsored health associations and groups supporting such associations (*5*, p. 9). The Wisconsin State law governing lay organized and operated health associations provides for noninterference by lay persons in professional affairs (*6*).

Prepayment Plans

Typically, the prepayment plans developed by cooperatives provide medical care in the doctor's office. They emphasize service to prevent the development of serious illness or disability to the extent that prevention may be possible through care in the early stages of an ailment, regular physical check-ups, and other preventive measures.

For prepayment plan coverage, a member family must pay a certain amount each year in advance. Some associations arrange for quarterly or semiannual dues payment if a member family wishes to pay in installments rather than in one lump sum annually. Most groups, however, provide that dues are payable annually on a certain date or within a certain period.

The annual dues of different groups range from $12 to $30 for one person; from $18 to $48 for a family of two; from $22 to $60 for a family of three; and from $25 to $66 for a family of four. Most groups require payment of an additional amount each year for each dependent when the family group numbers more than four. For dependent children, unmarried and living at home, the additional dues payment required by different groups ranges from $1 to $8. For adult dependents living with the family, it ranges from $2 to $15.

Cooperatives often refer to fully prepaid services as "free services." Actually, of course, so-called "free services" are those for which advance payment has been made in the form of annual dues. Usually cooperatives limit fully prepaid services to care provided by staff doctors at the association's health service center. In addition, each person in a member family is entitled, as a rule, to certain other services—usually X-ray and laboratory services and hospital care—at reduced rates.

Among the conditions excluded from prepaid services by one or more associations are ailments existing before a family joins; maternity care during the first 10 months; cases coming under the provisions of local, State, or Federal law; and chronic diseases.

Eighteen of the 19 prepaid service groups included in the study reported a total of 12,570 membership-certificate holders. Of these, about 10,000 were dues-paying member families. Family memberships averaged 3.5 persons. The prepayment plans of the 18 groups, therefore, covered about 35,000 persons.[2]

Services to Nonmembers

The members of cooperatives assume major responsibility for making health services available in their communities by their initial investment in facilities and equipment and by their payment of regular dues to support the local health service center. At the same time, they recognize that any health institution—particularly in a rural community deficient in local health services—has a responsibility to the community as a whole. The services offered by cooperative health service centers, therefore, are not restricted to members. They are available to any person in need of care. Nonmembers, however, must pay the fees for service customarily charged in the community, since they have not made an advance payment in the form of annual dues nor have they fulfilled other requirements for cooperative membership and participation in the prepayment plan. According to the reports of successful cooperatives, satisfied nonmember users of service are one source of new memberships after cooperative health service centers start operating.

Reports of operating prepaid service cooperatives show that, on the average, from 10 to 50 percent of their clinical services and from 25 to 50 percent of their hospital services are performed for nonmembers. The income from nonmembers, like that from members, as a rule, becomes part of the general funds of an association.

Pioneering Problems of Rural Health Cooperatives

Pioneering groups in any field are likely to meet skepticism, distrust, and opposition. This is true of health cooperatives just as it is of pioneering efforts in other fields of activity. Often their natural skepticism about a new idea keeps families from joining until they see substantial evidence that a cooperative can carry out its plans.

Groups tackling a new type of enterprise are also likely to lack facts needed to plan and develop sound organizations. A stumbling block to rural health cooperatives has been lack of information about costs and technical problems involved in building, equipping, and operating a health service center, as well as in developing and operating a prepayment plan. Often groups had no local resources to which they could turn for sound advice and needed facts. Many turned to an operating association, using it more or less as a model, sometimes without considering differences between its area and their own, or differences in conditions at the time of organization.

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[2] For all 24 prepaid service cooperatives operating in mid-1949, the reported membership-certificate holders totaled 14,500 families. About 40,250 persons were included in dues-paying member families.

Financing Problems

Many groups started with the thought that income from initial membership fees would provide most, if not all, the funds needed to build and equip a health service center. The amount actually needed often proved far greater than a group's original estimates. One association reported that the cost of its health service center was three times and another seven times what was originally planned. Problems of initial financing were among those that caused several groups to abandon their plans.

The fact that building costs were at first seriously underestimated led many groups into difficulty when they had to go back to their members for more funds. Some members lost confidence in the cooperative's leadership. The fact that the average family income was comparatively low in a number of areas also led to difficulty. An officer of one group said, "The association's plans have plenty of support, but when it comes to raising $100,000 it is another matter."

When groups borrowed rather heavily in order to complete and equip health service centers, they sometimes found it hard to repay the amounts borrowed. On the other hand, a group that refused to go into debt had a half-completed building in mid-1949 and no funds to complete it.

Problems of financing maintenance and operation, like those of initial financing, arose to some extent from lack of information and underestimating of actual costs. Some groups started with no funds on hand when they opened their health service center. At best, the income from annual dues, in the case of groups with their own prepayment plans, and from service charges paid by both members and nonmembers barely met operating expenses. Often a newly opened health service center operated "in the red" for at least a few months after opening. Several cooperatives found it necessary to increase the dues or other charges shortly after opening. This led to misunderstanding and sometimes to distrust when the reasons for the increase were not well understood by the members and the community.

Securing Doctors

Getting and keeping doctors in an isolated rural community is likely to prove difficult in view of current shortages of medical personnel. For some cooperatives, the problem has been accentuated by medical opposition. This opposition has taken several forms. Sometimes the doctors serving cooperatives have been unable to transfer their medical society membership to the local society. Or they have been unable to practice in local hospitals. One group reported that an employment agency refused its advertisement for a doctor.

Some groups have modified their plans in order to overcome medical opposition. One reported getting a doctor by dissolving the association and selling him its hospital. Another excluded medical and surgical care from its prepayment plan. Two gave up prepayment entirely. Medical opposition was among the underlying causes of the inability to get or keep a doctor reported by 7 of the 17 inactive or disbanded groups studied.

On the other hand, local doctors worked with some groups and other groups reached an understanding with local doctors and their organizations which enabled them to carry out their plans. On the State level, a meeting of medical and cooperative leaders in Texas led to the publication of a list of requirements for cooperatives by the State medical association (*7*, *8*). In June 1949, the American Medical Association took a similar step as the result of a series of meetings of a joint committee representing the American Medical Association, the Cooperative Health Federation, and other consumers' organizations (*9*).

Prepayment Plan Problems

Lay sponsorship of prepaid medical care plans is still a rather new idea. Many States have no law under which a group can organize for this purpose (*4*). Where groups can organize, they often lack information for setting up workable schedules of annual dues and prepaid services. They meet resistance from those opposed to lay development and control of prepayment systems as well as from those opposed to salaried payment of doctors—the system of payment usually used by cooperatives.

Some problems faced by health cooperatives with prepayment plans are also faced by other types of prepayment plans when they extend their operations into rural areas. Among these are such barriers to family participation as relatively low income and indifference, neglect, and lack of understanding. Adverse selection—the fact that those anticipating a need for service are most likely to join—is another problem cooperatives share with other prepayment plans. So also is the need to maintain dues and other charges at a level high enough to support services that will attract members and yet low enough to be within the reach of the average family's pocketbook.

Membership and Community Problems

Nearly all groups reported difficulty in getting enough members to support what the group proposed to do. One cooperative board member said that only half as many families joined as were originally expected. Another reported that failure to gain substantial community support was among the chief reasons for the group's present inactive status.

Delays in getting started contributed to difficulties in building membership. Doubts and rumors spread as to whether a cooperative would or could accomplish anything and whether it would be able to get good doctors even if it succeeded in building and equipping a health service center. In some areas the cooperative effort was abandoned because the need which the group was formed primarily to meet was cared for by plans to finance a hospital through a county bond issue, by the formation of a cooperative in a nearby community, or in some other way.

Community attitudes and situations also affected a group's success in getting members. Local opposition to cooperatives of all types, competing factions within communities, and rivalry between adjoining communities in some cases hindered a health cooperative in securing members.

Lack of information and understanding about what a comprehensive health service is and how it may be attained sometimes led to overemphasis on buildings and too little emphasis on other factors important in providing and maintaining adequate services. Indifference and complacency about health needs of the family and the community also led to difficulty in obtaining members and substantial community support.

Too great reliance on a single leader, difficulty in keeping people informed about a cooperative's status and progress, poor choice of location for a health service center, failure to secure doctors or managers who understood and sympathized with cooperative principles and methods, and lack of successful experience with other types of cooperatives are among other factors that sometimes hindered cooperative groups or caused their discontinuance.

Assets

"Local need was our greatest asset," according to the report of one cooperative. Others emphasized that the need for more doctors and more hospital beds in their areas helped them get support for their plans.

Assets to their development reported by some cooperatives offset problems reported by others. While a number of groups commented on the difficulty of raising funds to build and equip a health service center in a relatively poor area, others reported that good economic conditions at the time of organization helped them get started.

The support and cooperation of doctors in the area were reported by some groups as helping them avoid mistakes as well as providing an environment in which it was possible for them to carry out their plans. Eight cooperatives reported that getting well-qualified doctors who were well liked was one of their greatest assets in getting started and in gaining community acceptance.

Twenty associations reported strong support from many organizations and from all parts of their areas as among the chief factors contributing to their success. Success in keeping people informed about the reasons for delay and about the progress of a cooperative helped in gaining support. So also did the successful record of other types of cooperatives in the area.

Among other assets reported by the cooperatives were effective leadership; capable management; local understanding of cooperative principles and methods; gradual growth in understanding of the cooperative prepayment plan; successful operation and good service over a period of time; and the opportunity to demonstrate their ability to meet emergency needs of the community.

Recommendations

Based on their own experience, cooperative leaders made recommendations for capitalizing on local assets and avoiding or minimizing local problems. Nearly all emphasized that a group should first get the facts about local need and then take care to adapt their planning to actual need. In planning, they believed that care should also be taken to consider the community's resources. In addition, the feeling was expressed that it was better to start with the idea of building a community group interested in improving their health situation in whatever ways are possible and feasible rather than to start with a plan to build a hospital.

Other recommendations included:

1. Choose the organization committee or board carefully. Be sure they represent different organizations and different sections within the area.

2. Build membership soundly. Make certain that the association has adequate community support for its plans.

3. Keep people informed both during the organization period and afterward. The key to good membership relations is "to keep members in touch so they think of the association as their business."

4. Develop sound plans for financing; plan to have funds on hand when a health service center first opens.

5. Emphasize service in prepayment plans; "promise only what can

be delivered"; make preventive medicine part of the plan; keep accurate records of income from members and services they use.

6. Choose doctors carefully; make certain they are not just interested in a job but are interested in making and keeping people well; make businesslike arrangements with doctors.

7. Arrange for exchange of ideas among cooperatives and also, possibly, for group purchasing and use of special services.

Possibilities

The present record of health cooperatives parallels in many ways the past record of other types of cooperatives. Cooperatives to market farm products, purchase farm supplies, insure property, or secure credit, electricity, and other services have gone through similar stages of trial and error and met similar resistance. The security of their present place in the national economy is indicated by the fact that about two-thirds of the Nation's farmers now belong to one or more marketing, purchasing, or service cooperatives.[3]

Cooperatives, like other types of enterprise, however, must have a satisfactory environment in order to develop soundly and successfully. For such an environment, health cooperatives need State laws which permit their organization and operation, understanding and acceptance of their objectives and methods among members of the medical profession, and information and assistance on technical problems of setting up and operating a health service center and a prepayment plan.

Health cooperatives also need to have available information, based on the pooled experience of many groups, on general problems of organization and operation. An additional requirement for sound, well-balanced planning is to have in their communities better understanding of what good health means, what services are required to provide for its maintenance, and how these services can best be made available.

Along with these possible improvements in their environment, health groups, themselves, can use greater care in investigating their local situation and in defining their local need and ways to meet it in terms of services they must have locally and those they can arrange through health facilities and agencies elsewhere. They can obtain reliable facts about costs of setting up and operating a health service center and plan realistically to meet those costs. They can carry out sound education and information programs for their members and their communities. Finally, they can cultivate the interest and seek the endorsement and support of all local groups, including the medical profession, making a determined and sustained effort to draw into their planning and development all groups concerned.

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[3] Estimate based on figures reported for specialized groups of cooperatives such as dairy cooperatives, credit associations, and others. A single farmer, of course, often belongs to more than one association. There is at present no precise way to eliminate such duplication in reported membership figures

Some cooperative leaders have recommended group arrangements among cooperatives as a means of improving and expanding the services that any one cooperative health service center might find it possible to provide. Going beyond this recommendation, it would seem likely that in many cases health cooperatives might perform a worth while service for their communities if they worked out arrangements with health institutions under other sponsorship as well as with cooperatives in their areas for specialists' care and for sharing costly equipment and the services of technicians trained in its use.

As with other types of health institutions in rural areas, most cooperative health service centers have arrangements, usually informal, with nearby hospitals and doctors for at least occasional consultation and referral. These arrangements might well be formalized on a systematic basis and expanded in order that the services of all the participating health institutions might be strengthened and improved (*10*). The development of effective arrangements for area-wide integration of services would help rural health cooperatives, particularly those in sparsely settled areas, to meet one of the basic objectives of the Cooperative Health Federation which aims to "promote a more effective approach to the organization of medical care by combining a method of prepayment with a method of group practice" (*5*, p. 3).

Contribution

Although the achievements of rural health cooperatives thus far appear small measured in terms of total rural health needs, the organizations demonstrate interest and willingness on the part of rural people to work for their own health security. Moreover, cooperatives have developed a pattern of organization and operation combining efforts to establish health service centers and attract doctors with efforts to provide for their support and effective use by local people.

Cooperatives call for local people themselves to assume responsibility for providing adequate community health services. Whatever approach may be made to rural health problems, the best results can be achieved only as local people assume local responsibility and play an active part in meeting local need.

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The Cancer Program in Medical Schools

—A Review—

By Raymond F. Kaiser, M. D.*

The family physician, usually a general practitioner, is the person upon whom the great mass of people rely for care in their illnesses. It is this same family physician who has the first opportunity to suspect and discover the existence of cancer and other malignant conditions in their incipiency. The general practitioner is the "pivotal figure" in any cancer program because on his advice and its reception the welfare of the patient depends.

Since the first essential in the control of cancer is early diagnosis, the physician's education must be sufficiently specific to enable him to diagnose the many types of cancer in their earliest stages. Recognizing the fact that most family physicians see only a few cases of cancer annually, and taking cognizance of the difficulties involved in increasing their familiarity with the disease through postgraduate training, the National Advisory Cancer Council turned its attention to the teaching of cancer in medical schools. In 1944, a study was made of the teaching of cancer in medical schools by a subcommittee of the Council. This study indicated that a need existed for improving cancer teaching.

On the basis of this study (*1*) a conference of medical school deans and educators met in 1946 at the National Cancer Institute to discuss the problems of cancer teaching. They agreed that substantial changes should be made in professional cancer education so that the oncoming generation of general practitioners would be more adequately prepared to meet the cancer problem

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The conference recommended that (1) the deans and faculties of medical schools review their teaching of cancer, integrate cancer instruction in the basic sciences with clinical presentations of the disease, and stimulate cancer research in their schools since research improves teaching and stimulates student interest; and (2) that the Public Health Service consider ways and means of providing necessary financial assistance to medical schools to undertake integrated programs of cancer teaching through annual grants of from $10,000 to $25,000 for a period of years (*2*).

It was against this background that the National Cancer Institute in June 1947 undertook a program of grants to coordinate the teaching of cancer in medical schools. At the outset it was agreed that the intent of the program was not that of training specialists in oncology in the same sense that specialists are trained in radiology, pathology, or surgery. This program had as its objectives· (1) Developing an awareness of "cancer" among medical students; (2) coordinating cancer teaching in any manner which would provide the student with a comprehensive concept of the disease in all its aspects at some time during the course of his studies; (3) emphasizing the need for group presentation and consultation in the diagnosis and treatment of cancer; (4) utilizing current knowledge concerning the disease, filling in general gaps in students' knowledge; (5) improving the medical service to cancer patients; (6) de-emphasizing instruction as to the incurability of cancer; (7) stimulating student interest in cancer research; and (8) increasing the participation of the internist in the cancer teaching.

In initiating this program, it was realized that the method for improving cancer teaching would vary from school to school, and there was no desire on the part of the Council to suggest a uniform plan. It was decided that each school should endeavor to develop the type of teaching program which best met its particular circumstances. Since this was a long-range program, continuity of funds was essential, and the National Cancer Institute provided maximum assurance of such continuity. The use of grant funds was left, insofar as possible, to the discretion of each school concerned to permit maximum flexibility, with the reservation that these monies should not be used to replace existing budgetary commitments nor to underwrite specific research projects.

The degree of freedom considered essential to the program at the outset led to a certain hesitancy and confusion in the organization of suitable programs. Lack of precedents and the absence of specific instructions as to program content stimulated a review of existing cancer teaching practices by medical school faculties and resulted in the development of appropriate policies governing cancer teaching programs. Arising out of this situation was the establishment in the schools of medicine of what might be called an experimental program in cancer education. Also, it was recognized that to fulfill effectively the purposes of this program considerable integration was necessary. It was found that this could best be accomplished through the establishment of a position variously titled but essentially that of "coordinator of cancer teaching." Initially, the schools experienced some difficulty in obtaining qualified individuals who could serve in this capacity, and, in some instances, the schools found it necessary to recruit personnel from outside their own institutions. However, in a relatively short time all participating schools had designated a staff member to serve as cancer coordinator.

At present there are 8 radiologists, 25 pathologists, 35 surgeons, and 11 internists serving as cancer coordinators. At first, surgeons, radiologists, and pathologists were concerned with the cancer teaching problem. More recently the internist has become interested, and in some 20 schools the departments of medicine have been stimulated by this program to become active in cancer teaching. In a few instances, these persons have been appointed as heads of separate departments of oncology. In general, however, they serve as chairmen of cancer committees with representation from the departments of radiology, surgery, pathology, internal medicine, and medical administration. The cancer teaching program has accelerated the establishment of such cancer committees. These committees have diverse responsibilities, but, in general, they concern themselves with cancer teaching and research and serve as a screening advisory group for research activities and all matters relating to cancer within the medical school. Since the inception of this program, 74 cancer committees have been established.

As was anticipated, the cancer coordinators encountered a number of common problems in the conduct of their teaching programs. They experienced difficulty in crossing departmental lines. The somewhat inflexible nature of the medical school curriculum brought resistance to giving up curriculum hours. The amount of material the individual student must assimilate has increased tremendously and this added to the difficulty of the task. In a few instances, some degree of inertia was encountered, and, lastly, the concept of teaching cancer as a unified subject at first seemed to conflict with the orthodox principles of "horizontal teaching." There has been considerable discussion and varianee of opinion as to the advantages of "vertical" versus "horizontal" teaching. Although a few schools use the vertical plan and a large number use the horizontal method, it has become apparent that in by far the majority of schools the best solution is a combination of both methods of teaching, determined in large part by the custom in each school (*3*). These problems have been and are being gradually resolved. Each year brings further extension of suitable cancer teaching programs.

The schools present many variations in their programs to improve undergraduate medical education in cancer. However, all have one common denominator—the coordination of cancer teaching and other cancer interests in the medical school through one individual of professional rank who is responsible for the correlation of individual efforts in the various departments. All schools participating in the program have such an individual directing their cancer teaching activities.

Obviously, such a faculty member must have adequate assistance—a supporting staff of assistant professors, instructors, teaching fellows, stenographers, clerks, technicians, and research associates. Currently being supported under the teaching program are 73 men in 39 schools who are receiving training toward their specialty boards (pathology 23, surgery 20, internal medicine 14, radiology 12, obstetrics-gynecology 3, and pediatrics 1) while serving as instructors in cancer. In all, since the beginning of this program, 432 additional individuals have been added to the staffs of the Nation's medical schools. Since a cancer teaching program centers largely around the tumor or cancer clinic, any improvement in this facility generally enhances the effectiveness of the teaching program. Recognizing this situation, 20 schools have established tumor clinics and 39 additional schools have expanded or improved their clinics since the inception of this program, with a consequent increase of the students' contact with clinical material and improved services to cancer patients.

Out of the surveys conducted by the medical schools came evidence of the inadequacy of visual educational materials. As a result, eight schools established photography departments, and all schools renovated or supplemented facilities for visual education.

Obviously, good teaching in cancer requires an effective, adequate pathology service. Under this program, 53 schools have strengthened this service through preparation and collection of lantern slides or the addition of equipment to pathology laboratories. Nine schools have established tumor registers. Of particular interest is the fact that 27 schools have established cancer cytology teaching services with the assistance of this program.

Recognizing the fact that good clinic records and adequate follow-up services play an essential part in the management of cancer cases, and in cancer teaching as well, 38 schools have improved these areas. Secondarily, such improved services have enabled 17 schools to include social and psychological problems of the cancer patient.

Partial dissolution of the dividing lines between departments and disciplines has been necessary to promote the correlation of cancer instruction in medical schools. This correlation has been accomplished by: initiating or strengthening cancer seminars in 27 schools, tumor conferences in 57 schools, correlation conferences in 7 schools, cancer symposia in 30 schools, and small group studies in 14 schools. The free interchange of ideas, experiences, and points of view thus encouraged among members of the teaching staffs concerned with cancer cannot help but have a favorable effect on the development of pertinent cancer teaching programs.

As a means of drawing together the fragments of cancer knowledge which a medical student may have acquired during the earlier years of his medical training, 48 schools inaugurated new cancer courses concerned with cancer biology, its historical background, and other pertinent material during the last 3 years of the medical students' studies. Twenty-two schools have found it desirable to extend their cancer teaching in the field of radio-isotopes. Realizing that research is of paramount importance in developing the interest of instructors and students in cancer, 36 schools have found it possible to establish programs which provide students with opportunities for research, while 51 schools have strengthened their basic research activities. Of major importance is the fact that 31 schools have been stimulated to undertake clinical research studies, bringing the departments of medicine more actively into the cancer teaching program.

Over 3 years ago the first grants were made by the National Cancer Institute to schools of medicine to improve their teaching of cancer. It is now possible to point to a number of general accomplishments under this program:

1. There has been general acceptance of the program—all approved medical schools in the Nation are participating.

2. It has increased the awareness of cancer, not only in students but in medical school faculties as well.

3. It has stimulated the participation of the internist in cancer teaching.

4. It has pointed up the need for integration and correlation of cancer teaching, as well as teaching in other diseases.

5. It has broadened the concept of cancer as a disease worthy of special attention and deserving of identification as a distinct but not necessarily separate public health therapeutic and research problem.

6. It has increased cancer facilities and services to cancer patients through the establishment and further development of cancer clinics.

7. It has strengthened and expanded cancer histopathologic services through the addition of teaching tools and equipment in departments of pathology.

8. It has focused attention on visual education to a greater extent than ever before through the establishment of photography depart-

ments and supplementation of facilities and materials for visual education.

9. It has assisted in the establishment of more adequate record systems and has assisted in the development of follow-up services.

10. It has encouraged student research and assisted in the development of cancer research programs in a number of schools.

11. It has stimulated the expansion of clinical research.

12. It has pointed up the need for cancer instruction in postgraduate fields and has furthered such teaching.

13. It has brought about closer working relationships between medical schools and official health agencies.

14. Lastly, it has accomplished material improvement in the teaching of cancer.

The measure of success of this program depends not only on the formulation of instruction and its organization in the school curriculum but also on the enthusiasm and sound leadership of the medical schools and particularly of the physicians in charge of its policy.

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Studies on Mass Control of Dental Caries Through Fluoridation of the Public Water Supply

By H. Trendley Dean, Francis A. Arnold, Jr., Philip Jay, and John W. Knutson*

Numerous epidemiological studies (*1*) conducted in widely separated parts of the world clearly demonstrate that the use of fluoride drinking water during the formative period of the teeth is associated with a 60- to 65-percent reduction in dental caries experience. This inverse relationship between dental caries prevalence and fluorides in drinking water approaches its maximum at a fluoride (F) concentration of 1.0 to 1.5 ppm., a concentration which Dean (*2*) established as the minimum threshold concentration of mottled enamel or endemic fluorosis. These findings led to the proposal that optimum amounts of fluorides be added to the drinking water supply as a partial caries-control measure. The proposal engendered extensive field and laboratory studies on the physiological effects of fluoride ingestion (*1*). The results of these studies indicated that not only was 1.0 ppm. in the drinking water an optimal concentration for caries control but well within the limits of safety.

In 1945, three studies to determine the caries prophylactic value of artificially fluoridated drinking water were started in the United States and Canada. A number of additional study projects have been initiated in the United States since that time. One of the studies started in 1945, that in Grand Rapids, Mich., serves as the basis for this preliminary report.

Material and Methods

In order to afford a direct control on the observations during fluoridation of the drinking water supply at Grand Rapids, Mich., a control city, Muskegon, Mich., whose source of drinking water supply and geographical and climatological characteristics were similar to those of Grand Rapids, was selected. In addition, data were collected for direct comparisons with dental caries rates in Aurora, Ill., where the naturally occurring fluoride concentration of the public water supply is 1.2 ppm. of F. The base-line information collected consisted of detailed dental examinations of virtually the entire school population of Grand Rapids, Muskegon, and Aurora, those in continuous residence being selected for comparison in this report. The 1949 samples used for comparison in this report were taken from the kindergarten, and first, fourth, eighth, and eleventh grades.

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Fluoridation of the Grand Rapids water supply was started January 25, 1945. Sodium fluoride, over 90 percent pure, commercial grade, was used as the source of fluorine. Automatic feeders were employed to control the amount of sodium fluoride fed into the water supply, and daily tests were made at different points in the distribution system to assure maintenance of a uniform concentration of 1.0 ppm.

Table 1. *Distribution of children examined at Grand Rapids, Muskegon, and Aurora, according to age, continuity of residence, and year of examination*

Age	Grand Rapids, Mich.				Aurora, Ill.		Muskegon, Mich.			
	1944–45		1949–50		1945–46		1944–45		1949–50	
	Total	Contin. res.	Total	Contin. res.	Total	Contin. res.	Total	Contin. res.	Total	Contin. res.
4	396	323	101	75	40	30	23	20	64	51
5	2,163	1,633	1,050	777	573	407	570	402	462	340
6	2,425	1,789	994	697	721	473	760	462	534	393
7	2,481	1,806	94	54	774	516	679	408	50	30
8	2,355	1,647	198	155	723	469	678	376	22	12
9	2,371	1,639	686	519	610	368	660	357	269	197
10	2,323	1,626	187	125	645	397	682	359	81	52
11	2,309	1,556	188	140	614	383	603	293	198	146
12	2,483	1,685	190	130	645	401	623	328	66	28
13	2,498	1,668	779	574	661	401	662	377	333	214
14	2,658	1,690	218	153	801	433	717	369	119	66
15	2,431	1,511	111	64	872	467	648	292	76	34
16	1,721	1,107	306	209	633	371	481	248	219	132
Total	28,614	19,680	5,102	3,672	8,312	5,116	7,786	4,291	2,493	1,695

The mechanics of adding the fluoride to the water supply is relatively simple and the desired concentration was maintained (*3*). Examination of samples of children in Grand Rapids and Muskegon have been made yearly and will continue to be made for the duration of the study. In making the dental examinations, mouth mirror and explorer were used under good lighting conditions. The examinations were conducted in the school buildings and the findings recorded in a precoded system for direct transfer to punch cards so that the processing of the data could be handled with mechanical devices. The number of children examined in 1944–45 and in 1949 and their distribution by age are shown in table 1.

Findings

Deciduous Teeth. The dental caries experience in the deciduous teeth, expressed as def (decayed, extraction indicated, or filled)[1] teeth per child, is shown in table 2. In the 1944–45 examinations of Grand Rapids children, 323 four-year-olds had 4.2 def teeth per child; 1,633 five-year-olds, 5.4; 1,789 six-year-olds, 6.4 per child; and 1,806 seven-year-olds, 6.3 per child. In 1949, for Grand Rapids children, 75 four-year-olds had 2.7 def teeth per child;[2] 777 five-year-olds, 3.3; 697 six-year-olds, 4.6; and 54 seven-year-olds, 4.8. The reduction in the 1949 Grand Rapids rates by comparison with those for 1944–45 was 35.7, 38.9, 28.1, and 23.8 percent, respectively. The Muskegon data (table 2) show for the 1944–45 base line 402 five-year-olds with 6.8 def teeth per child, and for 462 six-year-olds, 7.2. The 1949 examinations of 340 five-year-old children and 393 six-year-old children show 5.6 and 6.0 def teeth per child, respectively, a percentage reduction from the Muskegon 1944–45 base line of 17.7 and 16.7 percent, respectively. It should be noted, however, that the 1944–45 rates for these age groups were somewhat higher than the 1944–45 base-line rates at Grand Rapids.

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[1] For purposes of further clarification "DMF" relates to the caries experience in permanent teeth while the lower case "def" relates to the caries experience of deciduous, or primary, teeth.

Table 2. *Dental caries experience, deciduous teeth, observed among 27,308 children, age 4–13, of Grand Rapids, Muskegon, and Aurora, expressed as def teeth per child with percentage reductions observed (continuous residents)*

Age	Grand Rapids, Mich.			Aurora, Ill.		Muskegon, Mich.		
	Examinations made		Percentage reduction	Examinations 1945–46	Percent less than G. R. 1944–45	Examinations made		Percentage less
	1944–45	1949–50				1944–45	1949–50	
4	4.2	2.7	35.7	2.1	50.0	---------	4.4	---------
5	5.4	3.3	38.9	2.8	48.2	6.8	5.6	17.7
6	6.4	4.6	28.1	3.4	46.9	7.2	6.0	16.7
7	6.3	4.8	23.8	3.5	44.4	6.7	---------	---------
8	5.8	4.7	19.0	3.6	37.9	6.1	---------	---------
9	4.6	4.4	4.3	3.0	34.8	4.9	4.5	8.2
10	2.8	2.9	−3.6	2.3	17.9	3.1	2.8	9.7
11	1.3	1.2	7.7	1.2	7.7	1.3	1.2	7.7
12	.5	.4	20.0	.4	20.0	---------	---------	---------
13	.2	.1	50.0	.1	50.0	---------	---------	---------

The school population of Aurora was examined in the fall of 1945 for the purpose of developing a caries experience expectancy curve. The Aurora data (table 2) shows how much less caries experience was present when compared with the Grand Rapids base-line data. As previously noted, the 1949 examinations at Grand Rapids showed reductions of 35.7, 38.9, 28.1, and 23.8 when compared with the 1944–45 rates. If the rates observed at Aurora are compared with the 1944–45 Grand Rapids data, reductions of 50.0, 48.2, 46.9, and 44.4 percent would be expected. Attention is called, however, to the inadequacy of the sample in the four- and seven-year-olds in the 1949

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[2] It is likely that the 1949 four-year-olds were somewhat older than the 1944–45 four-year-olds since they were all enrolled in kindergarten, whereas 1944–45 four-year-olds included nursery school or pre-kindergarten children.

Grand Rapids sample and that none of the six-year-olds had used fluoride water continuously since birth.

Permanent Teeth. Table 3 shows the DMF (decayed, missing, or filled teeth) rates for the permanent teeth of children aged 5 through 16 who were continuous residents. In 1944–45 at Grand Rapids, there were examined 1,789 six-year-old children, 1,806 seven-year-olds, 1,647 eight-year-olds, and 1,639 nine-year-olds; these specific age groups showed a DMF rate of 0.78, 1.89, 2.94, and 3.90, respectively. The 1949 Grand Rapids examination of 697, 54, 155, and 519 children in these respective age groups showed 0.38, 0.76, 2.16, and 2.48 DMF teeth per child or a reduction of 51.3, 59.8, 26.5, and 36.4 percent, respectively. Attention is called to the size of the samples of seven- and eight-year-olds and the selection of sample by school grade rather than by age.

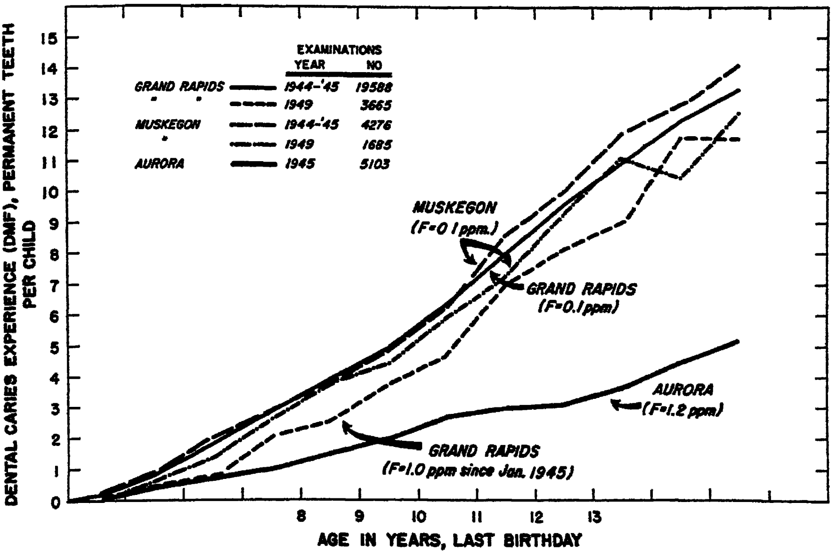
Table 3. *Dental caries experience, permanent teeth, observed among 33,955 children, age 5–16, of Grand Rapids, Muskegon, and Aurora, expressed as DMF teeth per child with percentage reductions observed (continuous residents)*

Age	Grand Rapids, Mich.			Aurora, Ill.		Muskegon, Mich.		
	Examinations made		Percentage reduction	Examinations 1945–46	Percent less than G. R. 1944–45	Examinations made		Percentage change
	1944–45	1949–50				1944–45	1949–50	
5	0.11	0.03	72.7	0.06	45.5	0.06	0.14	+133.3
6	.78	.38	51.3	.28	64.1	.81	.63	−22.2
7	1.89	.76	59.8	.70	63.0	1.99	1.43	−28.2
8	2.94	2.16	26.5	1.04	64.6	2.81	2.58	−8.2
9	3.90	2.48	36.4	1.52	61.0	3.81	3.88	+1.8
10	4.92	3.56	27.7	2.02	59.0	4.91	4.44	−9.6
11	6.41	4.69	26.8	2.67	58.4	6.32	5.93	−6.2
12	8.07	7.02	13.0	2.95	63.5	8.66	7.21	−16.8
13	9.73	8.11	16.7	3.09	68.3	9.98	9.52	−4.6
14	10.94	8.90	18.6	3.64	66.7	12.00	11.08	−7.7
15	12.48	11.90	5.5	4.54	63.6	12.86	10.32	−19.8
16	13.50	11.83	12.4	5.19	61.6	14.07	12.51	−11.1

At Muskegon, the 1944–45 examinations included 462 six-year-olds; 408 seven-year-olds, 376 eight-year-olds, and 357 nine-year-olds, with a DMF experience of 0.81, 1.99, 2.81, and 3.81, respectively. The 1949 examination embraced 393 six-year olds, 30 seven-year-olds, 12 eight-year-olds, and 197 nine-year-olds, with a DMF rate of 0.63, 1.43, 2.58, and 3.88, respectively. As is apparent from the numbers shown, only the six- and nine-year-olds warrant comparison. The six-year-olds in 1949 showed a 22.2 percent reduction from the 1944–45 rate; the nine-year-olds, a 1.8 percent increase.

If one compares the rates of five-, six-, and seven-year-olds at Aurora in 1945 with the present Grand Rapids rates for children in these age groups, it is noted that the DMF experience is quite similar. When these rates are compared with the 1944–45 Grand Rapids rates, the percentage reductions also tend to be alike. However, a very limited number of erupted permanent teeth in five-year-old children

AMOUNT OF DENTAL CARIES EXPERIENCE (DMF), PERMANENT TEETH IN GRAND RAPIDS, MUSKEGON, AND AURORA SCHOOL CHILDREN
(CONTINUOUS RESIDENTS)



and a small sample of children in the seven-year-old group for Grand Rapids in 1949 are the basis for these rates.

The chart summarizes graphically the tabular data given in table 3. The lines show the dental caries experience for the permanent teeth of children aged 5 through 16. The upper solid black line shows the dental caries prevalence recorded for the 19,680 continuous residents in the Grand Rapids 1944–45 base-line study. The long dash line shows the prevalence rate, 1944–45, at Muskegon, the control city. As may be seen, these base-line prevalence rates are almost identical until about 12 years of age when Muskegon's rates are slightly higher than Grand Rapids. The lower solid black line is the Aurora curve, based upon 5,116 examinations made in 1945.

An examination of the 1949 prevalence rates computed for Grand Rapids and Muskegon shows that in the latter city the curve roughly follows the 1944–45 base line. Note that for tbe Grand Rapids 1949 trend line the points for the five-, six- and seven-year-old children fall on the Aurora line, but for older children, aged 8 to 16 years, the Grand Rapids 1949 trend line is appreciably above that of Aurora. The slope of the 1949 Grand Rapids line beginning with the eight-year-olds is very similar to that of the Grand Rapids 1944–45 line. This finding suggests that Grand Rapids children, ages 8 to 16, are accumulating new carious permanent teeth at the same rate in 1949 as children in this age range were accumulating them in 1944–45. In other words, the five-, six-, and seven-year-olds of Grand Rapids in

1949 are on the Aurora expectancy curve. The very limited number of permanent teeth in five-year-olds and the small sample of seven-year-olds, however, make caution mandatory in interpretation of results. On the other hand, although the permanent teeth in six-year-old children have a very limited exposure time to dental caries attack, the large sample, 697, examined in 1949 at Grand Rapids, justifies comparison with the 473 Aurora children in the same age group. The 1950 examinations in the lower age groups should reveal highly important data.

Summary

Fluoridation of the Grand Rapids public water supply began in January 1945. Analysis of the 1949 dental examinations at Grand Rapids shows a reduced amount of dental caries experience when compared with the pre-fluoridation rates of 1944–45. The findings indicate that the reduction is most pronounced in the younger age groups whose dentition was largely calcified following the addition of one part per million of fluoride (F) to the previously fluoride-free public water supply. Sufficient time has not elapsed to evaluate water fluoridation in the older age groups.

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(*3*) Harris, W. L.: Experience in the application of fluorides to a public water supply. Lectures presented at the in-service training course for water works personnel, University of Michigan, School of Public Health, Ann Arbor, Mich., May 1945.

Incidence of Disease

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

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UNITED STATES

Reports From States for Week Ended October 7, 1950

New cases of acute poliomyelitis reported in the United States during the current week numbered 1,816, a 9-percent decrease from the 1,994 cases reported for the preceding week. This is the second consecutive week since May 20 that a decrease from the preceding week has been reported. The figure for this week is higher than the corresponding number (1,585) for 1949. The peak incidence of this disease to date occurred the week ended September 23, the latest week in any year during the past 20 years, with the exception of 1932. The cumulative total (22,219) for the current "disease" year was below the corresponding total (33,796) for last year, the highest on record. The "disease" year for acute poliomyelitis begins with the twelfth week of the calendar year.

The cumulative total for the calendar year was 23,351, compared with the total of 34,709 for the corresponding period last year.

Comparative Data for Cases of Specified Reportable Diseases: United States

[Numbers after diseases are International List numbers, 1948 revision]

Disease	Total for week ended—		5-year median 1945–49	Seasonal low week	Cumulative total since seasonal low week		5-year median 1944–45 through 1948–49	Cumulative total for calendar year		5-year median 1945–49
	Oct. 7, 1950	Oct. 8, 1949			1949–50	1948–49		1950	1949	
Anthrax (062)	-------	-------	(1)	(1)	(1)	(1)	(1)	33	41	(1)
Diphtheria (055)	155	228	287	27th	1,176	1,727	2,220	4,304	5,495	8,517
Acute infectious encephalitis (082)	20	18	18	(1)	(1)	(1)	(1)	736	613	506
Influenza (480–483)	1,557	1,163	1,171	30th	9,409	6,990	6,990	255,668	82,857	148,291
Measles (085)	683	641	737	35th	2,908	2,527	2,915	291,079	591,045	555,310
Meningococcal meningitis (057.0)	44	38	49	37th	157	140	140	2,956	2,656	2,776
Pneumonia (490–493)	1,029	999	------	(1)	(1)	(1)	(1)	65,885	61,699	-------
Acute poliomyelitis (080)	1,816	1,585	1,142	11th	[2]22,219	33,796	19,177	[2]23,351	34,709	19,644
Rocky Mountain spotted fever (104)	9	4	6	(1)	(1)	(1)	(1)	431	535	516
Scarlet fever (050)	586	722	783	32d	2,917	3,088	3,815	43,087	60,754	65,872
Smallpox (084)	1	1	1	35th	1	3	3	27	44	150
Tularemia (059)	5	2	13	(1)	(1)	(1)	(1)	739	920	776
Typhoid and paratyphoid fever (040, 041)[3]	88	122	102	11th	2,256	2,718	2,718	2,766	3,206	3,206
Whooping cough (056)	1,577	1,520	1,589	39th	1,577	1,520	1,589	98,772	48,122	77,464

[1] Not computed.
[2] Deduction: Georgia, week ended September 30, 2 cases.
[3] Including cases reported as salmonellosis.

For the current week, eight of the total of nine geographic divisions decreased from the preceding week in reported cases of acute poliomyelitis. These decreases ranged from 77 (517 to 440) cases reported in the Middle Atlantic States to 7 (548 to 541) in the East North Central States. The increase in the East South Central States was 20 cases which included 12 (30 to 42) cases in Kentucky and 6 (6 to 12) in Alabama.

For the current week, the States reporting the largest numbers of cases were: New York (286), Ohio (157), Michigan (153), Illinois (125), Pennsylvania (106), and Iowa (89).

Alaska reported 16 cases compared with 11 last week. The cumulative total for the calendar year was 31. Hawaii reported 1 case for the week.

Rocky Mountain spotted fever was reported by 6 States with a total of 9 cases. The cumulative total number for the calendar year to date is 431 cases which may be compared with the 5-year (1945–49) median of 516.

The total number of new cases of infectious encephalitis reported for the current week was 29 which may be compared with 18 for the corresponding week last year. The 5-year (1945–49) median was 18 cases. For the calendar year, a total of 736 cases was reported which is the highest cumulative total reported during the past 5 years.

The total number of cases of diphtheria reported for the week was 155 compared with 131 last week and 228 for the corresponding period last year. For the calendar year, a total of 4,304 cases was reported, the lowest total number reported for corresponding periods in the past 5 years.

One case of smallpox was reported in Tennessee.

Deaths During Week Ended October 7, 1950

	Week ended Oct. 7, 1950	*Corresponding week, 1949*
Data for 93 large cities of the United States:		
Total deaths	8,893	9,012
Median for 3 prior years	9,012	----------
Total deaths, first 40 weeks of year	364,541	364,589
Deaths under 1 year of age	692	641
Median for 3 prior years	641	----------
Deaths under 1 year of age, first 40 weeks of year	24,674	25,915
Data from industrial insurance companies:		
Policies in force	69,537,367	70,091,442
Number of death claims	11,831	11,511
Death claims per 1,000 policies in force, annual rate	8.9	8.6
Death claims per 1,000 policies, first 40 weeks of year, annual rate	9.3	9.2

Reported Cases of Selected Communicable Diseases: United States, Week Ended Oct. 7, 1950

[Numbers under diseases are International List numbers, 1948 revision]

Area	Diphtheria (055)	Encephalitis, infectious (082)	Influenza (480–483)	Measles (085)	Meningitis, meningococcal (057.0)	Pneumonia (490–493)	Poliomyelitis (080)
United States	**155**	**29**	**1,557**	**683**	**44**	**1,029**	**1,816**
New England	**1**		**1**	**58**	**5**	**40**	**84**
Maine				3		7	8
New Hampshire							1
Vermont				3			1
Massachusetts	1			42	2		38
Rhode Island			1	1			1
Connecticut				9	3	33	35
Middle Atlantic	**5**	**13**	**1**	**145**	**4**	**235**	**440**
New York	4	13	[1]	62	4	161	286
New Jersey	1		1	33		34	48
Pennsylvania				50		40	106
East North Central	**13**	**2**	**17**	**179**	**10**	**111**	**541**
Ohio	3		1	20	3		157
Indiana	2		9	6		15	41
Illinois		1	1	17	2	55	125
Michigan	8		2	43	4	31	153
Wisconsin		1	4	93	1	10	65
West North Central	**6**	**4**	**26**	**29**	**4**	**165**	**188**
Minnesota	5		2	13		15	27
Iowa	1				2		89
Missouri			2	8	1	11	14
North Dakota		1				111	3
South Dakota		1		4	1		5
Nebraska			22	1		5	17
Kansas		2		3		26	33
South Atlantic	**62**		**322**	**55**	**2**	**114**	**227**
Delaware				3			3
Maryland	2		2	2		11	51
District of Columbia			1	1		9	4
Virginia	9		227	12	1	27	55
West Virginia	4		70	17		5	28
North Carolina	26			7			31
South Carolina	8		17	1		7	16
Georgia	9		4	7	1	47	25
Florida	4		1	5		8	14
East South Central	**35**	**1**	**32**	**16**	**6**	**36**	**91**
Kentucky	3			5		10	42
Tennessee	6	1	16	10	5		28
Alabama	20		12	1	1	17	12
Mississippi	6		4			9	9
West South Central	**25**	**1**	**1,040**	**64**	**9**	**241**	**95**
Arkansas	7		73	5		7	9
Louisiana	1		2	2	2	21	4
Oklahoma	5	1	68	7		18	18
Texas	12		897	50	7	195	64
Mountain	**4**	**2**	**100**	**34**		**34**	**28**
Montana	1		10	1			1
Idaho			11	8			5
Wyoming							
Colorado			9	10		26	12
New Mexico				2			4
Arizona	3	2	70	5		6	1
Utah				7		2	5
Nevada				1			
Pacific	**4**	**6**	**18**	**103**	**4**	**50**	**122**
Washington	1	1		25	1	3	30
Oregon	1		13	5	1	13	23
California	2	5	5	73	2	34	69
Alaska						3	16
Hawaii			10				1

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[1] New York City only.

Reported Cases of Selected Communicable Diseases: United States, Week Ended Oct. 7, 1950—Continued

[Numbers under diseases are International List numbers, 1948 revision]

Area	Rocky Mountain spotted fever (104)	Scarlet fever (050)	Smallpox (084)	Tularemia (059)	Typhoid and paratyphoid fever[1] (040, 041)	Whooping cough (056)	Rabies in animals
United States	**9**	**586**	**1**	**5**	**88**	**1,577**	**132**
New England		**30**			**1**	**240**	
Maine		2				20	
New Hampshire						5	
Vermont						39	
Massachusetts		24			1	66	
Rhode Island		1				81	
Connecticut		3				29	
Middle Atlantic		**69**			**12**	**314**	**13**
New York		[2] 24			6	129	13
New Jersey		8			2	101	
Pennsylvania		37			4	84	
East North Central		**143**		**2**	**12**	**471**	**33**
Ohio		56			5	160	
Indiana		17		1	1	30	[3] 27
Illinois		20			2	37	1
Michigan		36		1	3	167	5
Wisconsin		14			1	77	
West North Central		**36**			**2**	**62**	**8**
Minnesota		6			1	15	
Iowa		1				12	7
Missouri		18			1	5	
North Dakota		1				8	
South Dakota		1				7	
Nebraska		7				3	
Kansas		2				12	1
South Atlantic	**7**	**122**			**19**	**140**	**15**
Delaware					2		
Maryland	2	7				14	
District of Columbia						2	
Virginia	3	14			5	14	1
West Virginia		18			3	30	2
North Carolina	1	51			1	42	
South Carolina		6			3	10	6
Georgia	1	23			5	23	6
Florida		3				5	
East South Central	**1**	**83**	**1**		**6**	**59**	**23**
Kentucky		11			2	9	14
Tennessee		52	1		4	23	3
Alabama	1	19				25	3
Mississippi		1				2	3
West South Central		**29**		**2**	**17**	**146**	**29**
Arkansas		2		2	2	20	2
Louisiana		3			4	15	
Oklahoma		5			4	6	1
Texas		19			7	105	26
Mountain		**9**		**1**	**5**	**60**	**9**
Montana		1				17	
Idaho		1				14	
Wyoming					1		9
Colorado		2			2	8	
New Mexico					1	4	
Arizona		4			1	7	
Utah		1		1		10	
Nevada							
Pacific	**1**	**65**			**14**	**85**	**2**
Washington		13				20	
Oregon	1	5			1	14	
California		47			13	51	2
Alaska					2		
Hawaii		4					

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[1] Including cases reported as salmonellosis.
[2] Including cases reported as streptococcal sore throat.
[3] Report for 4 weeks.

FOREIGN REPORTS

CANADA

Reported Cases of Certain Diseases—Week Ended Sept. 16, 1950

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Brucellosis	-------	-------	-------	-------	3	1	-------	-------	-------	1	5
Chickenpox	1	-------	15	1	13	64	13	7	17	25	156
Diphtheria	-------	-------	-------	-------	2	-------	-------	1	-------	1	4
Dysentery, bacillary	-------	-------	-------	-------	7	6	3	-------	-------	-------	16
Encephalitis, infectious	-------	-------	-------	-------	1	-------	-------	1	1	-------	3
German measles	-------	-------	-------	-------	1	33	-------	5	7	15	61
Influenza	-------	-------	18	-------	-------	7	3	-------	-------	-------	28
Measles	-------	-------	1	-------	53	50	7	7	10	9	137
Meningitis, meningococcal	-------	-------	-------	-------	1	2	-------	-------	1	1	5
Mumps	-------	-------	4	-------	62	66	10	33	34	24	233
Poliomyelitis	-------	-------	-------	1	2	17	1	10	13	4	48
Scarlet fever	-------	-------	-------	-------	14	12	8	4	8	1	47
Tuberculosis (all forms)	9	-------	3	4	137	28	24	14	-------	43	262
Typhoid and paratyphoid fever	-------	-------	-------	1	35	2	-------	-------	-------	11	49
Venereal diseases:											
Gonorrhea	4	-------	8	3	72	77	46	20	60	111	401
Syphilis	5	-------	6	3	37	13	3	25	4	7	103
Whooping cough	-------	-------	10	-------	59	130	12	-------	2	48	261

CYPRUS

Typhoid fever. An outbreak of typhoid fever was noted in Cyprus during the week ended August 19, 1950, when 64 cases were reported. More than half this number was stated to have occurred in the Famagusta district.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

The following tables are not complete or final for the list of countries included or for the figures given. Since many of the figures are from weekly reports, the accumulated totals are for approximate dates.

CHOLERA

(Cases)

Place	January–July 1950	August 1950	September 1950—week ended—				
			2	9	16	23	30
ASIA							
Burma	312	100	5	23	1	-------	-------
Akyab	2	-------	-------	-------	-------	-------	-------
Bassein	3	-------	-------	-------	-------	-------	-------
Kyaukpyu	-------	1	-------	-------	-------	-------	-------
Maubin	3	-------	-------	-------	-------	-------	-------
Moulmein	-------	-------	-------	-------	1	-------	-------
Pegu	1	-------	-------	-------	-------	-------	-------
Rangoon	1	5	-------	-------	-------	-------	-------
Toungoo	-------	1	6	1	-------	-------	-------

CHOLERA—Continued

Place	January–July 1950	August 1950	September 1950—week ended—				
			2	9	16	23	30
ASIA—continued							
India	82, 817	16, 407	3, 343	[1] 2, 037	[1] 1, 266	[1] 70	
Ahmedabad	7	1					
Allahabad	3						
Bombay	[2] 309	110	1	6	2	1	
Calcutta	[2] 8, 355	340	49	29	29	30	
Cawnpore	1						
Cocanada	2						
Cuddalore	31			1			
Lucknow	12						
Madras	11	[2] 11	11	17	27	39	
Masulipatam	47						
Nagpur	4	27	1	1	11		
Negapatam	67	21	2	3	5		
New Delhi	61	56	1	4	3		
Port Blair (Andaman Islands)	[3] 2						
Tellicherry	27						
Tiruchirappalli	1						
Trichinopoly	1						
Tuticorin	25			1			
India (French)	819	252	26	27			
Karikal	381	1					
Pondicherry	438	251	26	27			
India (Portuguese)		17					
Indochina	16	3		1			
Cambodia	5						
Viet Nam	11	3		1			
Giadinh	3						
Rachgia	1						
Pakistan	21, 954	1, 206	322	[1] 77	[1] 17		
Chittagong	185	1					
Dacca	191		1				

[1] Preliminary figures. [2] Includes imported cases. [3] Imported.

PLAGUE

(Cases)

AFRICA							
Belgian Congo	17	11				1	
Costermansville Province	5	[1] 9					
Stanleyville Province	[3] 12	2				[1] 1	
Madagascar	48	4			[3] 1		
Rhodesia, Northern	2						
Union of South Africa	10	1					
Orange Free State	7	1					
Transvaal Province	1						
Johannesburg	[1] 1						
ASIA							
Burma	223	9			1		
Bassein	1						
Bhamo	[4] 4						
Henzada	14	1					
Kyaiklat	34						
Minhla	1	1					
Moulmein	[4] 3						
Myaungmya	5						
Myingyan	2						
Pegu	3	1					
Pyapon	3						
Rangoon	[4] 8						
Yenangyaung	58						
China:							
Chekiang Province	[5] 37						
Wenchow	[6] 4						
Fukien Province	706						
Amoy	10						
Kwangsi Province	[6] 63						
Kwangtung Province	527						
India	36, 639	671	[7] 268	[7] 61	[7] 71		
Allahabad	[3] 19						
Bombay	[4] 5						
Calcutta	[4] 3						
Cawnpore	18						
Lucknow	[4] 9						

See footnotes at end of table

PLAGUE—Continued

Place	January–July 1950	August 1950	September 1950—week ended— 2	9	16	23	30
ASIA—continued							
Indochina:							
Annam	78	5	1			1	
Phanthiet	74	5	1			1	
Cambodia	[9]46						
Pnompenh	3						
Cochinchina	12	3					
Saigon	1						
Laos	2						
Indonesia:							
Java	377	13	5	5	1		
Bandoeng	3						
Djakarta	[4]2	1					
Jogjakarta	201	12	5	5	1		
Pakistan	1						
Karachi	[8]1						
Thailand	56						
SOUTH AMERICA							
Brazil	5						
Bahia State	2						
Pernambuco State	3						
Ecuador	25	3					
Chimborazo Province	4						
El Oro Province	4						
Loja Province	17	3					
Peru	18						
Ancash Department	3						
Lambayeque Department	2						
Libertad Department	1						
Lima Department	5						
Piura Department	7						
Venezuela	5						
Miranda State	5						

[1] Pneumonic plague. [2] Includes 1 case of pneumonic plague. [3] Sept. 1–10, 1950. [4] Includes imported cases. [5] Includes 4 cases of pneumonic plague. [6] Deaths. [7] Preliminary figures. [8] Imported. [9] Includes suspected cases.

SMALLPOX

(Cases)

AFRICA							
Algeria	90	7					
Angola	144						
Bechuanaland	38						
Belgian Congo	2,039	787	117	170	245		
British East Africa:							
Kenya	10						
Nyasaland	246	2		7			
Tanganyika	2,725	434			5	1	
Uganda	3			1			
Cameroon (British)	344	48					
Cameroon (French)	93						
Dahomey	217	53			[1]4	[3]34	
Egypt	[3]4						
Eritrea	1						
Ethiopia	23	3					
French Equatorial Africa	446	3					
French Guinea	12						
French West Africa: Haute Volta	205						
Gambia	5						
Gold Coast	173	50	6				
Ivory Coast	553	60			[1]10		
Libya	2						
Mauritania	1						
Morocco (French)	9	1					
Mozambique	180	28					
Nigeria	13,817	452	[4]7	[4]5	[4]4		
Niger Territory	1,059	10			[1]5		
Rhodesia:							
Northern	4						
Southern	458						
Senegal	2						

See footnotes at end of table

SMALLPOX—Continued

Place	January-July 1950	August 1950	September 1950—week ended—				
			2	9	16	23	30
AFRICA—continued							
Sierra Leone	30	1	--------	--------	--------	--------	--------
Sudan (Anglo-Egyptian)	72	1	--------	--------	--------	--------	--------
Sudan (French)	108	60	--------	--------	--------	--------	--------
Togo (French)	48	24	--------	--------	--------	--------	--------
Tunisia	1	--------	--------	--------	--------	--------	--------
Union of South Africa	614	18	2	--------	--------	--------	--------
ASIA							
Afghanistan	291	17	--------	--------	--------	--------	--------
Arabia	331	2	--------	--------	[5] 3	--------	--------
Bahrein Islands: Bahrein	34	2	--------	--------	--------	--------	--------
Kamaran Island: Kamaran	--------	--------	[5] 2	--------	--------	--------	--------
Burma	4,987	17	--------	2	1	--------	--------
Ceylon	[5] 1	1	--------	--------	--------	--------	--------
China	746	--------	--------	--------	--------	--------	--------
India	111,977	5,971	[6] 979	[6] 624	[6] 309	--------	--------
India (French)	172	70	18	26	--------	--------	--------
India (Portuguese)	83	7	--------	--------	--------	--------	--------
Indochina	[7] 335	27	--------	--------	4	--------	--------
Indonesia:							
Borneo	480	80	28	38	--------	--------	--------
Java	3,618	946	185	212	190	--------	--------
Sumatra	342	2	--------	--------	--------	--------	--------
Iran	212	26	1	--------	--------	--------	--------
Iraq	139	[3] 5	2	1	--------	--------	--------
Israel	16	--------	--------	--------	--------	--------	--------
Japan	6	--------	--------	--------	--------	--------	--------
Korea (Republic of)	1,331	--------	--------	--------	--------	--------	--------
Lebanon	2	--------	--------	--------	--------	--------	--------
Netherlands New Guinea	3	--------	--------	--------	--------	--------	--------
Pakistan	14,201	1,054	202	--------	--------	--------	--------
Palestine	95	--------	--------	--------	--------	--------	--------
Straits Settlements:							
Singapore	--------	[3] 2	--------	--------	--------	--------	--------
Syria	15	--------	--------	--------	--------	--------	--------
Thailand	460	--------	--------	--------	--------	--------	--------
Transjordan	35	--------	--------	--------	--------	--------	--------
Turkey (See Turkey in Europe.)							
United Nations Relief and Works Agency for Palestine Refugees	12	3	--------	--------	--------	--------	--------
EUROPE							
Great Britain:							
England: Liverpool	[5] 1	--------	--------	--------	--------	--------	--------
Scotland: Glasgow	21	--------	--------	--------	--------	--------	--------
Greece	[8] 15	--------	--------	--------	--------	--------	--------
Athens	1	--------	--------	--------	--------	--------	--------
Piraeus	1	--------	--------	--------	--------	--------	--------
Xylokastron	1	--------	--------	--------	--------	--------	--------
Portugal	1	--------	--------	--------	--------	--------	--------
Spain: Canary Islands	1	--------	--------	--------	--------	--------	--------
Turkey	9	--------	--------	1	--------	--------	--------
NORTH AMERICA							
Guatemala	3	--------	--------	--------	--------	--------	--------
Mexico	506	--------	--------	--------	--------	--------	--------
SOUTH AMERICA							
Argentina	517	--------	--------	--------	--------	--------	--------
Brazil	48	12	3	4	--------	--------	--------
Chile	[7] 3,565	[9] 11	--------	--------	[10] 7	--------	--------
Colombia	557	7	6	--------	--------	--------	--------
Ecuador	117	14	2	5	2	--------	--------
Paraguay	1	3	--------	--------	--------	--------	--------
Peru	1,691	--------	--------	--------	--------	--------	--------
Venezuela	1,216	--------	--------	--------	--------	--------	--------
OCEANIA							
Australia: Freemantle	[5] 1	--------	--------	--------	--------	--------	--------

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[1] Sept. 1-10, 1950. [2] Sept. 11-20, 1950. [3] Includes imported cases. [4] In Lagos only. [5] Imported. [6] Preliminary figures. [7] Corrected figure. [8] Includes suspected cases. [9] Aug. 1-12, 1950. [10] Aug. 13-Sept. 16, 1950.

TYPHUS FEVER*

(Cases)

Place	January-July 1950	August 1950	September 1950—week ended—				
			2	9	16	23	30
AFRICA							
Algeria	100	6					
Basutoland	22	2					
Belgian Congo	[1] 78	[2] 5		3			
British East Africa:							
Kenya	23						
Uganda	1						
Egypt	82	4	1			1	
Eritrea	[2] 19	1					
Ethiopia	513						
French Equatorial Africa	5						
Gold Coast	7	1					
Libya:							
Cyrenaica	27						
Tripolitania	70						
Madagascar	[1] 2						
Morocco (French)	6	2			1		
Morocco (International Zone)	1						
Morocco (Spanish Zone)	6						
Mozambique	5						
Nigeria	1						
Rhodesia, Southern	6						
Sierra Leone	[2] 5						
Sudan (Anglo-Egyptian)	4						
Tunisia	53	1					
Union of South Africa	76	P					
ASIA							
Afghanistan	[2] 1,292	5					
Burma	[2, 4] 15						
China	[1] 20						
India	275	1					
India (Portuguese)	22	8					
Indochina	[2] 29	2	1				
Indonesia:							
Java	6						
Sumatra	1						
Iran	171	5					
Iraq	124	4		1		1	
Japan	[1] 927						1
Korea (Republic of)	1,183						
Lebanon	1						
Netherlands New Guinea	2						
Pakistan	92	5	1				
Palestine	3						
Straits Settlements: Singapore	[1] 5	1	[2] 1				
Syria	[1] 37			1	1		
Transjordan	17	3					
Turkey (see Turkey in Europe).							
United Nations Relief and Works Agency for Palestine Refugees	4						
EUROPE							
France	1						
Germany (British Zone)	[1] 2						
Germany (French Zone)	2						
Germany (United States Zone)	2						
Great Britain:							
England: Liverpool	[2, 5] 1						
Island of Malta [2]	16	10			1		
Greece	27	1					
Hungary	4						
Italy	37						
Sicily	29						
Poland	37						
Portugal	2						
Spain	25	[6] 2					
Turkey	170	12	1	1	2	5	2
Yugoslavia	247						
NORTH AMERICA							
Costa Rica [2]	12	2					
Guatemala	20						
Jamaica [2]	24	3	2				
Mexico [1]	313	8	2		1		
Panama Canal Zone	[2] 3						
Puerto Rico [2]	15	1		1	1		

See footnotes at end of table.

TYPHUS FEVER—Continued

Place	January-July 1950	August 1950	September 1950—week ended—				
			2	9	16	23	30
SOUTH AMERICA							
Argentina	2						
Chile	93	14		6	5		
Colombia	470	10	1				
Curacao	[2] 1						
Ecuador	[1] 173	[1] 23	[2] 2	[2] 1		[2] 2	
Peru	677						
Venezuela	114						
OCEANIA							
Australia [2]	92	7	2	1			
Hawaii Territory [2]	7						

---

* Reports from some areas are probably murine type, while others include both murine and louse-borne types.

[1] Includes murine type. [2] Murine. [3] Corrected figure. [4] Includes 7 deaths reported as cases (in Rangoon). [5] Imported. [6] In Madrid.

YELLOW FEVER

(C—cases; D—deaths)

Place		January-July 1950	August 1950	September 1950—week ended— 2	9	16	23	30
AFRICA								
French Equatorial Africa	C	1						
Port Gentil	C	[1] 1						
Gold Coast	C	12	1					
Accra	D	1	[1] 1					
Ankobra Ferry	D	1						
Bogoso	C	[1] 1						
Kade	C	1						
Oda Area:								
Akwatia	C	[2] 7						
Atiankama	C	1						
Nigeria	D	1	1					
Calabar	D	[3] 1						
Ibadan	D		[1] 1					
Sierra Leone	C	2						
Koinadugu District	C	[4] 2						
NORTH AMERICA								
Panama:								
Colon	D	1						
SOUTH AMERICA								
Bolivia	C	867						
Chuquisaca Department	C	[5] 850						
La Paz Department	C	[6] 17						
Brazil	D	2						
Bahia State	D	1						
Ipiau	D	1						
Maranhao State	D	1						
Colinas	D	1						
Colombia	D	4						
Magdalena Department	D	1						
Los Angeles, Rio de Oro	D	1						
Putumayo Commissary	D	3						
Mocoa Locality	D	3						
Peru	D	6						
Cuzco Department	D	2						
Quincemil	D	2						
Huanuco Department	D	1						
Tingo Maria	D	1						
Junin Department	D	1						
San Ramon	D	1						
San Martin Department	D	2						
Juanjui	D	1						
Lamas	D	1						

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[1] Suspected. [2] Includes suspected cases. [3] Imported. [4] Includes one suspected case. [5] Estimated number of cases reported (230 deaths) in an outbreak in Azero Province Jan. 1–Mar. 14, 1950. [6] Outbreak in North and South Yungas Provinces (8 deaths).

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Public Health Reports

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— Editorial —

Evaluation of Therapy

Throughout the history of medicine there have been many episodes in which enthusiasm over untested drugs or therapeutic procedures has led to a premature and uncritical acceptance of such measures as "cures" or "remedies." The bitter disillusionment and disappointment which followed was a serious blow not only to the patients involved, but to medicine itself.

The fight against tuberculosis has had its full measure of these episodes. We can recall, for example, the widespread heralding of tuberculin and gold in the treatment of the disease, and their subsequent discreditation. Because of the very nature of tuberculosis—its chronicity, its remissions and exacerbations, and its protracted onset and course, to say nothing of its overwhelming toll of human suffering and death—it is, of course, most difficult to maintain an objective and critical attitude toward therapeutic measures which show any likelihood of promise.

Moreover, the proper evaluation of any kind of tuberculosis therapy is fraught with the most serious difficulties. Walker and Barnwell[1] have aptly summarized these difficulties as follows: "It would be useful to recall the factors which make clinical tuberculosis unusual—(a) the many anatomical subdivisions into which it must be divided, subdivisions which are connected only by a common etiology and pathology and are so disparate from each other that one is faced, really, with a whole dictionary of diseases rather than with a single entity; (b) the extraordinary chronicity, which makes necessary a long continued period of observation; (c) the difficulty, the impossibility in any single instance except those of miliary and meningeal tuberculosis, of prophesying recovery or death, which makes necessary the observation of many cases, and (d) the peculiarities of the bacillus

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[1] Walker, A. M. and Barnwell, J. C.: Clinical evaluation of chemotherapeutic drugs in tuberculosis. Annals of New York Academy of Sciences. 52: 742 (1949).

This is the fifty-seventh of a series of special issues of PUBLIC HEALTH REPORTS devoted exclusively to tuberculosis control. The special issues began March 1, 1946, and appear the first week of each month. The articles are reprinted as extracts. Effective with the July 5, 1946, issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 10 cents a single copy. Subscriptions are obtainable at $1.00 per year; $1.25 foreign.

which make it difficult for culture and different in its virulence against various racial and familial groups."

The discovery of streptomycin a few years ago brought with it a new hope for the effective treatment and ultimate conquest of tuberculosis. Early tests indicated that the new antibiotic was not uncontrollably toxic and that it was bacteriostatic *in vivo.* However, with the promise of this new drug came also the responsibility for determining its precise place in the treatment of the disease.

The accompanying article, "A Controlled Investigation of Streptomycin Treatment in Pulmonary Tuberculosis" reports a study of streptomycin which has been conducted as a cooperative venture. Acknowledging the complexity of the disease and the fact that no single institution can furnish enough cases for a definitive answer, a group of tuberculosis clinicians in hospitals and sanatoria in widespread points of the United States joined in this cooperative study, each adhering steadfastly to a carefully designed protocol. The manner in which this evaluation study was undertaken cannot but be considered a tribute to the courage and scientific acumen of those who participated in the program.

There is no doubt that further work in this area will produce refinements of technique and improvements of methods, for there is much yet to be learned about the most effective way in which such studies should be carried out. However, the streptomycin study reported in this issue illustrates that in the evaluation of specific tuberculosis therapy, the scientific approach and the careful use of controls are essential.

ROBT J. ANDERSON, *Medical Director,*
Chief, Division of Tuberculosis.

A Controlled Investigation of Streptomycin Treatment in Pulmonary Tuberculosis

By Esmond R. Long, M. D., and Shirley H. Ferebee, B. A.*

In March 1950, 12-month observations were completed on the last of a series of 541 tuberculous patients studied to determine the effect of adding streptomycin to other therapeutic measures in the treatment of tuberculosis. Preliminary analyses of the results are presented at this time.

In July 1947, the Tuberculosis Study Section of the Division of Research Grants and Fellowships of the National Institutes of Health was asked to plan and direct clinical trials on streptomycin therapy in the treatment of tuberculosis. Previous investigations had indicated a distinct and often dramatic improvement in many cases treated with streptomycin. However, further evidence was essential to distinguish the effect of the drug from the vagaries of the disease and the effect of other treatment. The Study Section agreed that the major portion of the funds specifically appropriated by the Congress for streptomycin research could best be employed in a rigorously planned investigation designed to determine, through the use of concurrent controls, the effect of adding streptomycin to other therapeutic measures.

Investigators in different parts of the country, with grants from the Division of Research Grants and Fellowships, participated in the study, managed their cases under a common protocol, and made uniform observations at uniform time periods.

The inquiry included the broad range of pulmonary tuberculosis, excluding only minimal disease at one extreme and terminal disease at the other. The criteria for the selection of cases were: pulmonary disease, bacteriologically proved, and judged capable of significant objective improvement without streptomycin.

Admission of Cases

The cooperating clinical investigators submitted X-ray films and laboratory and clinical data on patients under care in their institutions whom they considered suitable candidates for the study. This material was received in a central office, where the Study Section's Selection Panels met at 3-week intervals from November 1947 through

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*Chairman, Steering Committee, Tuberculosis Study Section, National Institutes of Health, and Chief, Therapy Evaluation Section, Field Studies Branch, Division of Tuberculosis, Public Health Service, respectively. Presented at the 46th Annual Meeting of the National Tuberculosis Association, Washington, D. C., April 25, 1950.

February 1949 to consider cases submitted by the investigators Each panel was composed of three clinical experts in tuberculosis who determined independently, without knowing the name of the patient or the institution, whether each case satisfied the criteria for admission to the study.

At the time of selection, every "admitted" case was classified by each member of the selection panel in the scale between "arrested" and "dead" according to the prognosis for 1 year without streptomycin. This prognostic rating was used to array separately for each hospital the cases in an order ranging from the most to the least favorable prognosis. It was determined by chance for each hospital whether the odd- or even-numbered cases should be allocated to the streptomycin group. Thus, in each hospital, the patients in the groups receiving and not receiving streptomycin were approximately equal in number and severity of disease. In this way, any conditions within a hospital which might influence response to therapy would presumably bear equally on both the streptomycin and control groups.

Of the 629 candidates proposed by the clinical investigators, 541 were approved by selection panels for study. No new cases were accepted for study after February 1949.

Observation and Treatment Period

All patients in both groups received any form of therapy, including collapse or surgical procedures, which the individual clinical investigator thought was indicated. It should be stressed that the participating clinical investigators had complete freedom of judgment in the management of the cases in the study except with respect to the variable under investigation, streptomycin therapy. In two initially comparable groups, other forms of therapy not dependent upon streptomycin should be indicated equally for cases in the two groups. In this way, it was expected that patients receiving streptomycin would be managed in essentially the same way as the controls, but with the addition of 20 mg. of streptomycin per kilogram of body weight for 91 days.

Additional treatment with streptomycin was permissible under the protocol. It was recognized that there was available no definitive knowledge as to the optimum length of streptomycin therapy. The study was designed to determine the effect of adding streptomycin to accepted therapeutic procedures. The optimum length of streptomycin therapy beyond the 91-day course was decided for each patient in the streptomycin group by the hospital in which he was under treatment. Actually, only 27 cases received a second course of the drug. Thus, the question might be phrased, "What can streptomycin at its indicated optimum add to all other treatment?"

According to the protocol, each patient was to remain under observation for 1 year from the time of selection for the study. At the end of each 3-month period, as well as at the time of selection, clinical and bacteriological records and X-rays were sent to the central office for coordinated evaluation and study.

Initial Characteristics of Population

If the usefulness of adding streptomycin to classical therapeutic measures is to be judged by comparing the degree of progression and retrogression in two groups of patients, these two groups must be comparable at the beginning of the observation period and thus possess equal potentialities for change. It is pertinent then to examine the two groups at selection with respect to as many variables as possible. Table 1 gives information on the characteristics of cases in the two groups at the time of selection for study. It is obvious from inspection that the streptomycin and control groups are similar with respect to all the variables considered. Therefore, examination of the composition of the two groups may be simplified by a discussion of the characteristics of the total group under observation.

About six-tenths of the cases were white, and there were slightly more males than females. Approximately half of the patients were betweer 25 and 44 years of age, with fewer "over 45" than "under 25".

An indication of the recency of the disease is afforded by information on the length of the present hospitalization. At the time of selection for study, about six-tenths of the cases had been in the sanatorium for less than 3 months. No account has been taken of whether the present hospitalization was the first or one in a series of hospital stays for tuberculosis.

That only two-tenths of the cases were markedly febrile at the time of selection for study may appear surprising for a group of tuberculous patients until one considers that these were patients already under care in the cooperating institutions and were not necessarily selected for study at the time of their hospital admission.

Approximately three-tenths of the group under study were not producing sputum at the time of selection, another six-tenths, only a slight or moderate amount, and less than one-tenth, copious sputum.

The fact that less than 5 percent of the patients had received any previous treatment with streptomycin therapy at the time of selection for study reflects a situation which probably could not again be duplicated in these or similar sanatoria. It would not now be possible to accumulate in these hospitals a series of over 500 patients who had not already been treated with streptomycin. Thus, this study was, on the very practical point of available case material alone, carried out

Table 1. *Characteristics of 270 streptomycin and 271 control cases at time of selection for study*

Characteristics and treatment		Percent of group	
		Streptomycin	*Control*
Race	White	59.6	62.0
	Nonwhite	40.4	38.0
Sex	Male	53.0	53.1
	Female	47.0	46.9
Age	Under 25	27.0	28.4
	25-44	54.8	51.[illegible]
	45 and over	18.2	20.[illegible]
Length of recent hospitalization	Less than 3 months	63.6	55.0
	3 to 5 months	12.6	16.2
	6 to 11 months	15.6	16.6
	1 year or more	8.2	12.2
Temperature	Markedly febrile	18.5	19.2
	Slightly febrile	50.0	43.9
	Afebrile	31.5	36.9
Body weight	Normal or overweight	24.4	24.6
	Underweight	75.6	75.4
Amount of sputum	None	28.8	27.2
	Slight	27.4	30.6
	Moderate	34.8	34.7
	Copious	9.0	7.5
Previous streptomycin therapy	Streptomycin	4.4	3.3
	No streptomycin	95.6	96.7
Surgery or collapse procedures in effect	None	74.2	73.0
	Pneumothorax	8.0	8.6
	Pneumoperitoneum	9.1	10.1
	Thoracoplasty	2.2	6.1
	Phrenic nerve operation	1.5	2.2
Stage of disease	Moderately advanced	34.3	34.7
	Far advanced	65.7	65.3
Predominant morphology	Exudative	38.7	41.2
	Caseous	48.6	44.7
	Fibrotic	12.7	14.1
Dynamics	Acute	36.5	35.8
	Subacute	41.4	42.3
	Chronic	22.1	21.9
Course	Progressive	68.8	63.7
	Stationary	25.4	28.1
	Retrogressive	5.8	8.4
Cavitation	Definitely present	83.5	84.8
	Not present	16.5	15.2

Cases receiving more than one form of surgery or collapse procedure are duplicated

at the latest date on which a control study on streptomycin could have been made.

Surgical or collapse procedures were in effect in only about one-fourth of the cases in each group at the time of selection for study The two groups were very similar except that there were slightly more patients among the controls who had had thoracoplasty prior to the study. By the National Tuberculosis Association quantitative classification of X-ray findings, about two-thirds of both groups had far advanced and one-third, moderately advanced disease.

The type of disease which extended over the largest area within the diseased portion of the lungs determined the qualitative or morphological classification which was based on consideration of prestudy and selection films and clinical data. Nearly half of both groups were judged to have predominantly caseous disease, most of the others had predominantly exudative disease, and only a small remainder, fibrotic. Note should be taken of the use of the qualifying term "predominant," since it is recognized that the tuberculous process is a continuum usually containing more than one morphological element and that such judgments based on film interpretation are at best crude estimates

The tuberculous disease was classified as subacute for more than two-fifths of the total, acute for about two-fifths, and chronic for only about one-fifth. The disease was judged to be progressive in nearly two-thirds of the group, stationary in one-fourth, and in only a small remainder, retrogressive or improving at the time the cases were selected for study. Four-fifths of the total cases under observation showed definite cavities on X-ray.

Losses

In this study, as in most similar ones, certain "losses" in the groups under observation occurred. Both the nature and the extent of such losses must be examined to determine the effect upon the remaining observations. If losses from two initially comparable groups are unrelated to the variable under investigation, in this instance, receipt of streptomycin, the comparability of those remaining in the two groups is not disturbed. But, on the other hand, if a particular kind of case is lost from one group in greater numbers than from the other, the remainders plainly are no longer comparable.

Table 2 shows the losses occurring in the streptomycin and control groups by time of occurrence. By the end of 12 months, 44 streptomycin cases and 77 control cases were considered lost.

Discharges from the hospital with medical consent were approximately equal in the two groups, 15 streptomycin and 17 control cases. However, more control cases left the hospital against medical advice, 35 compared with 22 in the streptomycin group. The lower unadvised departure rate among those receiving drug therapy may have been due to psychological factors. The tabulation indicates that in the streptomycin group there were only 4 such losses during the first 6 months, that is, during and immediately after the 91-day course of streptomycin, as compared to 18 during the second 6 months. There were, of course, other cases discharged but only those with no further observations after discharge were considered losses.

Two cases of tuberculous meningitis occurred in the control group, and were treated immediately with streptomycin, while none was reported in the streptomycin group. They have been included in the

Table 2. "*Losses*" *occurring in the streptomycin and control groups by reason and by report period*

	Total	3 months	6 months	9 months	12 months
Streptomycin group					
Total	44	8	5	13	18
Left hospital:					
With permission	15		2	3	10
Against advice	22	1	3	10	8
Refused streptomycin	2	2			
Incomplete course of streptomycin	5	5			
Control group					
Total	77	15	18	20	24
Left hospital:					
With permission	17	1	1	2	13
Against advice	35	4	10	13	8
Meningitis	2	1	1		
Treated with streptomycin:					
Appeals approved	12	1	5	4	1
Without clearance	11	8	1	1	2

analysis as control deaths since, before the availability of streptomycin, such cases are all believed to have died very soon. A small, relatively unimportant, group of 7 streptomycin cases had to be considered "not available" because they either refused the drug or did not complete the 91-day course.

In order to protect the study from great losses due to treatment of the controls with streptomycin, an appeals board was created. This board reviewed the clinical and X-ray data on control cases in which a critical, potentially life-threatening tuberculous episode had occurred and for which streptomycin might be considered the only possible effective therapy. Of the 22 cases considered by the board, deviation from the protocol was authorized for 12 controls. In addition, 11 other controls received streptomycin without clearance, contrary to the protocol.

In the analysis, observations have been included on lost cases up to the period when the loss occurred. For example, if a patient left the hospital after 8 months' observation, data on such a patient collected at the 3- and 6-month report periods have been included in the comparisons of the two groups at those points in time. For report periods occurring after the date of loss, observations on lost cases have been considered "not available." The most troubling losses from the standpoint of analysis are the controls treated with streptomycin. Several alternative methods of handling the "streptomycin treated controls" were considered but none appeared entirely satisfactory. The decision was finally reached to include them among the "not available" group recognizing that this method created a bias favoring the controls. In the discussion of the results further mention will be made of the effect of this bias.

An indication of the effect of losses on the comparability of the remaining cases in each group may be obtained by a consideration of what the composition of groups under study would have been if the lost cases had never been admitted to the study. In appendix table 1, the characteristics *at selection* of the total groups with which the study was begun are compared with the characteristics for the groups which completed 3, 6, 9, and 12 months. The remaining groups under observation decrease at each further point in time and this table is designed to indicate whether the character of the groups changed and, if so, whether that change was different in the streptomycin and the control groups. It is apparent that there were shifts in the composition of the groups under study as losses occurred. However, the two groups still retain their basic similarity: although both differ from their original composition, they are still like each other.

Results

Mortality

Deaths during the 12-month observation period occurred unequally in the two groups, 21 in the streptomycin group and 40 in the controls. As shown in the text table below, the greater number of deaths in the control group is produced almost entirely by a higher rate among the controls during the first 6 months of observation, when 26 controls and only 8 streptomycin cases died. During the second 6-month period, there were 13 deaths in the streptomycin group and 14 in the control group. If the decreasing difference in rates should represent a "death delaying" rather than a "life saving" phenomenon, then it would be expected that with continued observation the mortality rate would be higher at some later period for the streptomycin than for the control group. As data on this point become available, the results of further observation will be reported.

Deaths in the streptomycin and control groups by time of occurrence

Group	*Total*	*3 Months*	*6 Months*	*9 Months*	*12 Months*
Streptomycin	21	4	4	6	7
Control	40	11	15	9	5

Table 3 shows by age, race, and sex, the distribution of the deaths in the streptomycin and control groups occurring during the 12 months of observation, as well as the rates per 100 persons in each subgroup. In both groups, the mortality rate is higher for males than for females and higher among nonwhites than among whites.

Deaths among nonwhite males in the controls were high in every age group, ranging between 26.3 and 31.6 per 100 persons. Although nonwhite males 25 years of age or older receiving streptomycin had similar rates, those under 25 years of age receiving streptomycin showed no deaths. The nonwhite females showed a different pattern:

Table 3. *Deaths by age, race, and sex in streptomycin and control groups during 12 months of observation*

Race and sex	All ages		Under 25 years		25-44 years		45 and over	
	Sm	Control	Sm	Control	Sm	Control	Sm	Control
	Number of deaths							
All races	21	40	3	12	13	22	5	6
Male	15	21	--------	5	11	10	4	6
Female	6	19	3	7	2	12	1	--------
White	5	14	--------	2	2	9	3	3
Male	4	7	--------	--------	2	4	2	3
Female	1	7	--------	2	--------	5	1	--------
Nonwhite	16	26	3	10	11	13	2	3
Male	11	14	--------	5	9	6	2	3
Female	5	12	3	5	2	7	--------	--------
	Number of persons							
All races	270	271	73	77	148	139	49	55
Male	143	144	30	32	75	68	38	44
Female	127	127	43	45	73	71	11	11
White	161	168	42	41	83	87	36	40
Male	83	96	13	13	41	49	29	34
Female	78	72	29	28	42	38	7	6
Nonwhite	109	103	31	36	65	52	13	15
Male	60	48	17	19	34	19	9	10
Female	49	55	14	17	31	33	4	5
	Deaths per 100 persons							
All races	7.8	14.8	4.1	15.6	8.8	15.8	10.2	10.9
Male	10.5	14.6	--------	15.6	14.7	14.7	10.5	13.6
Female	4.7	15.0	7.0	15.6	2.7	16.9	9.1	--------
White	3.1	8.3	--------	4.9	2.4	10.3	8.3	7.5
Male	4.8	7.3	--------	--------	4.9	8.2	6.9	8.8
Female	1.3	9.7	--------	7.1	--------	13.2	14.3	--------
Nonwhite	14.7	25.2	9.7	27.8	16.9	25.0	15.4	20.0
Male	18.3	29.2	--------	26.3	26.5	31.6	22.2	30.0
Female	10.2	21.8	21.4	29.4	6.5	21.2	--------	--------

among the controls, the rates were high for those under 45 years of age, with no deaths among those over 45; those receiving streptomycin showed a high rate among those under 25, a low rate for those between 25 and 44, and no deaths among those over 45.

Deaths among white males were greater among the controls in the 25- to 44-year-age group, and among the streptomycin cases in the 45- to 65-age group. White females showed the highest rate for the controls in the 25- to 44-year range, while there was only one death among white females receiving streptomycin.

As judged by the deaths per 100 persons, it appears that streptomycin was most effective in reducing mortality among nonwhite males under 25 years of age, nonwhite females between the ages of 25 and 44, white males from 25 to 44 years, and white females under 45 years. However, since the detailed comparisons are based on very small numbers, the findings must be taken as indicative rather than conclusive.

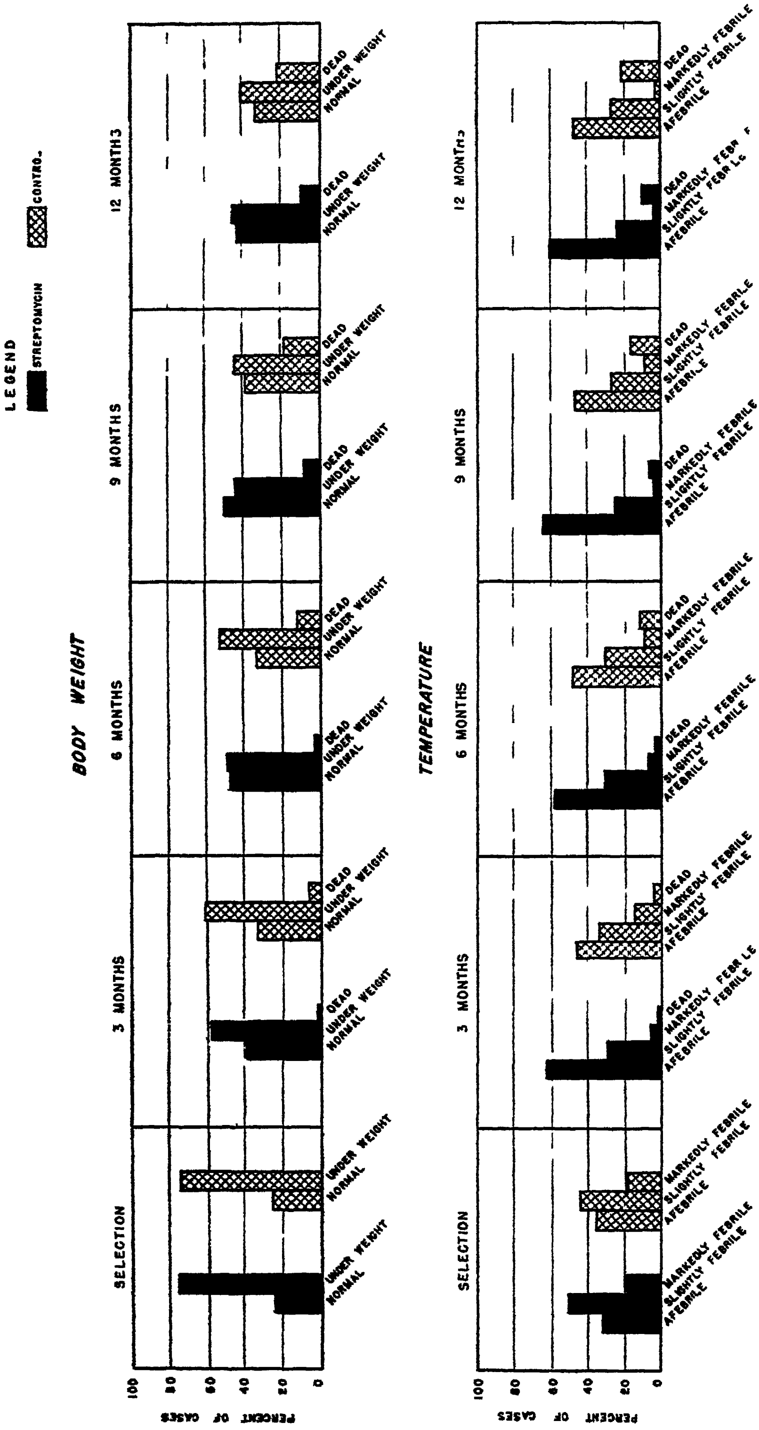
Clinica Change

Every 3 months during the year of observation, the results of detailed uniform examination of all patients under study were reported to the central office. Observations are available on such a wide variety of items as urinalysis, blood-urea-nitrogen, complete blood counts, cough, activity, appetite, and toxic manifestations. However, for this preliminary analysis, the streptomycin and control groups have been compared only with respect to those items generally regarded as the most critical measures of change in tuberculosis. Data are presented in this section on temperature, body weight, and amount and bacillary content of sputum. In the body of the paper, the percentage distributions of the two groups at each report period are presented in tabular and graphic form, based on the total observations available, while the appendix contains corresponding tables of the actual frequencies, including the number of observations "not available." Since the material on which the findings are based is not very large for many of the subdivisions, the random error must be very great, and results based on the smaller groupings must be viewed as suggestive only, subject to confirmation or disproof. For each of the examinations, the patients under study have been subdivided according to an appropriate scale ranging from the optimum to the least favorable condition.

Body Weight

Changes in body weight are significant only when viewed against some sort of measure of the desirability of such change. Circumstances such as general body build, normal weight, and previous weight changes obviously vary greatly among a large group of patients and are not easily classified objectively. Therefore, a simple scheme which takes some account of these factors has been used in this analysis. On the basis of weight, age, and height, each patient in the study has been classified as overweight, normal weight, or underweight. Deviation of 10 pounds from the norm as given in a standard chart has been used for classification as over or under weight. In table 4 and the first section of figure 1, normal and overweight have been grouped together, as representing a desired or favorable end of the scale of weight change.

Examination of the "underweight" category shows a great similarity between the streptomycin and control groups; about 75 percent of each were underweight at time of selection and more than 40 percent of each were still underweight at the end of a year. However, of the patients whose underweight status changed, those receiving streptomycin tended to improve and move into the "normal or overweight" category, while among those not receiving streptomycin about twice as many died as improved with respect to weight gain.


LEGEND
STREPTOMYCIN
CONTROL
BODY WEIGHT
TEMPERATURE
SELECTION
3 MONTHS
6 MONTHS
9 MONTHS
12 MONTHS
PERCENT OF CASES
0
20
40
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SLIGHTLY FEBRILE
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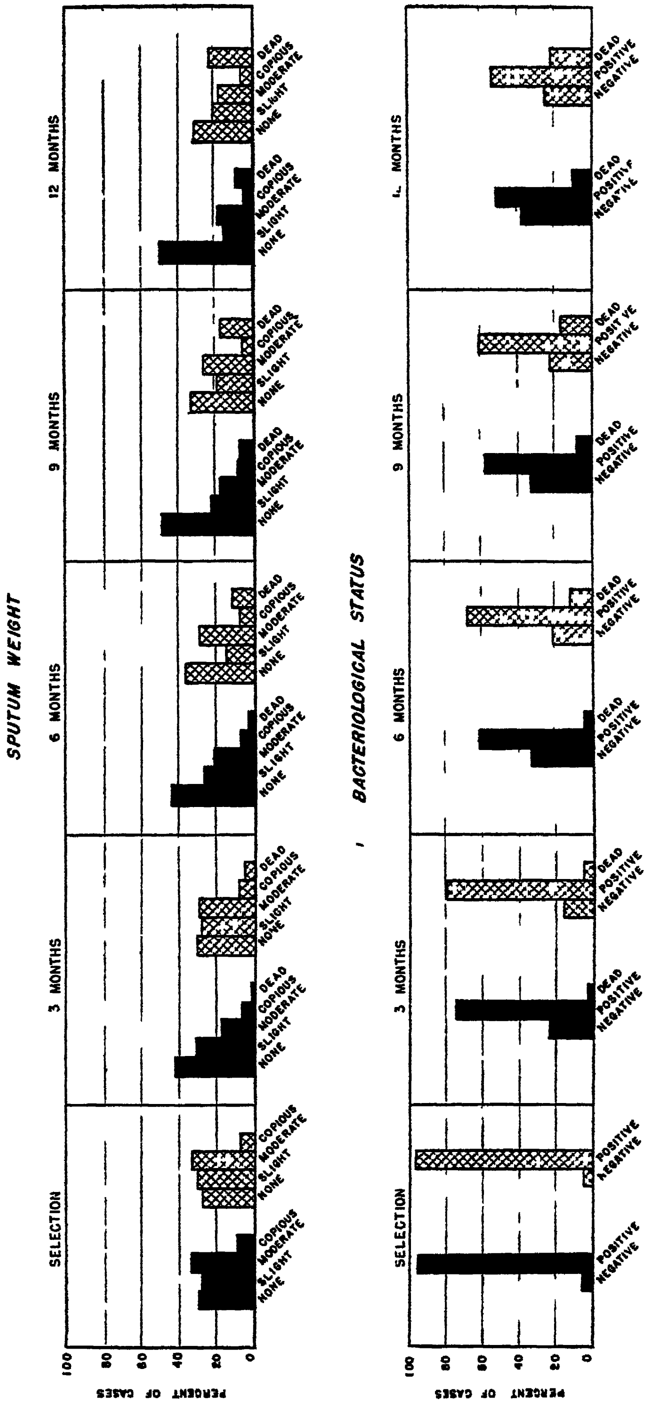

Figure 1. Percentage distribution of streptomycin and control groups according to four clinical measures at each report period

Table 1. *Percentage distribution of streptomycin and control groups by body weight[1] at each report period*

	Total[2]		Normal or overweight		Underweight		Dead	
	Sm	Control	Sm	Control	Sm	Control	Sm	Control
Selection	100.0	100.0	24.4	24.6	75.6	75.4	-------	-------
3 months	100.0	100.0	39.8	33.6	58.6	61.5	1.6	4.9
6 months	100.0	100.0	47.9	33.3	48.7	54.3	3.4	12.4
9 months	100.0	100.0	48.8	37.7	44.7	44.0	6.5	18.3
12 months	100.0	100.0	44.9	35.4	44.9	41.7	10.2	22.9

[1] Based on standard height-weight chart, minus deviation of 10 or more pounds considered underweight

[2] Based on available observations.

Temperature

Oral afternoon temperatures taken during a 7-day interval at the 3-, 6-, 9-, and 12-month report periods were averaged for each patient. In table 5 and the second section of figure 1, the streptomycin and control patients have been subdivided according to three temperature levels: afrebrile, 98.6° F. or less; slightly febrile, 98.7° to 99.5°; markedly febrile, 99.6° or higher.

While the proportion of the two groups which were markedly febrile at selection is very similar, the streptomycin group dropped sharply at 3 months and remained around the same 5-percent level throughout the year. On the other hand, the controls showed a much slower decrease in the proportion which were markedly febrile, but at the end of 12 months showed fewer with temperatures above 99.6° than the streptomycin group. More accurate comparisons can, perhaps, be made between the "slightly febrile" and "afebrile" proportions in the two groups.

Although similar at selection, the two groups differed markedly in the proportions "slightly febrile" and "afebrile" at subsequent periods. Among those receiving streptomycin, nearly half of the slightly febrile group appeared to have become afebrile by the end of 3 months. No further major changes occurred during the remain-

Table 5. *Percentage distribution of the streptomycin and control groups by temperature[1] at each report period*

	Total[2]		Afebrile		Slightly febrile		Markedly febrile		Dead	
	Sm	Control	Sm	Control	Sm	Control	Sm	Control	Sm	Control
Selection	100.0	100.0	31.5	36.9	50.0	43.9	18.5	19.2	-------	-------
3 months	100.0	100.0	63.0	45.2	29.8	35.3	5.7	15.1	1.5	4.4
6 months	100.0	100.0	59.3	47.8	31.5	31.2	6.0	9.6	3.2	11.4
9 months	100.0	100.0	63.8	46.9	25.9	27.3	4.3	9.1	6.0	16.7
12 months	100.0	100.0	60.9	47.5	24.8	27.1	4.3	3.3	10.0	22.1

[1] Average oral afternoon temperature for 1 week: afebrile 98.6 or less; slightly febrile 98 7-99.5; markedly febrile above 99.6.

[2] Based on available observations.

der of the year among those receiving streptomycin, The proportion afebrile continued around 60 percent and the proportion slightly febrile, around 25 percent. Loss of fever was much less common among those who did not receive streptomycin, with an increase among the controls in the proportion afebrile of only 10 percent in 12 months, from 37 to 47 percent. But it is interesting that nearly all of this change occurred during the first 3 months, just as in the streptomycin group.

In general, the two groups tended to shift during the year in opposite directions, that is, the slightly febrile cases showed a greater tendency to become afebrile if they were receiving streptomycin, and the markedly febrile cases showed a greater tendency to move into the "dead" category if they were not receiving streptomycin.

Amount of Sputum

Data collected on the daily amount of sputum produced on 7 consecutive days at each report period were averaged for each patient. For simplicity, the average daily amounts were arbitrarily divided into four classes: none—less than 10 grams daily; slight—10 to 29 grams; moderate—30 to 99 grams; and copious—more than 100 grams. The percentage distributions of the streptomycin and control groups at selection and at 3, 6, 9, and 12 months are given in table 6, and the distributions are shown graphically in the third section of figure 1.

At the beginning of the study, the bulk of the cases in both groups were fairly equally distributed between the "none," "slight," and "moderate" categories with only a few cases producing copious amounts of sputum.

By the end of 3 months, however, the streptomycin group had shown a marked increase in the proportion of cases producing virtually no sputum, and that proportion continued to increase throughout the year, although at a slower rate. This increase in the proportion not producing sputum was, of course, accompanied by a decrease in the categories of those producing sputum. Those with moderate amounts of sputum showed the most rapid decrease at the end of 3 months.

Table 6. *Percentage distribution of streptomycin and control groups by amount of sputum* [1] *at each report period*

	Total [2]		None		Slight		Moderate		Copious		Dead	
	Sm	Control	Sm	Control	Sm	Control	Sm	Control	Sm	Control	Sm	Control
Selection	100.0	100.0	28.8	27.2	27.4	30.6	34.8	34.7	9.0	7.5	------	------
3 months	100.0	100.0	42.3	31.6	31.5	27.0	18.5	28.7	6.2	8.2	1.5	4.5
6 months	100.0	100.0	43.9	37.8	26.6	15.6	20.1	28.0	6.1	7.0	3.3	11.6
9 months	100.0	100.0	47.1	34.5	22.0	19.0	18.1	24.5	6.6	4.5	6.2	17.5
12 months	100.0	100.0	50.0	32.0	16.4	20.8	19.2	18.0	4.3	6.7	10.1	22.5

[1] Average daily number of grams for 1 week; none—less than 10; slight—10 to 29; moderate—30 to 99; copious—100 or more.

[2] Based on available observations.

In the control group there was a much slighter and more gradual increase in the proportion without sputum, and a tendency for cases to move into the "dead" category rather than the improved ratings.

Bacteriological Status

Since bacteriological examinations of patients under study were made with varying frequency in the different hospitals, specimens taken within a broad range on either side of the designated time periods have been considered in the comparison of bacteriological changes in the two groups. When sputum specimens were unavailable for examination, an attempt was made to obtain specimens by gastric lavage. The results of examination of smears were reported, and cultures planted from each specimen. Since adequate growth on a culture was necessary for subsequent sensitivity testing for the streptomycin group, a more intensive effort to obtain positive cultures for the streptomycin cases may have resulted.

Data presented in table 7 and in the fourth section of figure 1 are based on the following interpretation of laboratory results: specimens have been considered positive for tubercle bacilli if either the culture or smear was positive. Thus, the emphasis has been placed on the purity of the negative group, that is, a case has not been regarded as bacteriologically negative if there was any contrary evidence by any method. The few negatives in each group at the beginning of the study represent those for whom a positive smear or culture could not be obtained during the designated observation period at the time the case was selected for study. However, positive bacteriological status had previously been established for these cases just as for all other cases in the study.

Table 7. Percentage distribution of streptomycin and control groups by bacteriological status at each report period

	Total[1]		Negative		Positive		Dead	
	Sm	Control	Sm	Control	Sm	Control	Sm	Control
Selection	100.0	100.0	3.3	2.6	96.7	97.4	------	------
3 months	100.0	100.0	23.6	16.1	74.9	79.5	1.5	4.4
6 months	100.0	100.0	34.9	21.6	61.9	67.1	3.2	11.3
9 months	100.0	100.0	34.9	22.9	59.1	60.7	6.0	16.4
12 months	100.0	100.0	38.2	24.5	51.9	54.2	9.9	21.3

[1] Based on available observations.

The proportion of both groups for which tubercle bacilli were found declined from nearly 100 percent at the beginning of the study to only about 50 percent at the end of 1 year, although the decrease was more rapid among those receiving streptomycin. In other words, from an original positive bacteriological status, half of both the streptomycin and the control cases were still positive at the end of 12 months. Among those whose positive status changed, four-fifths of the streptomycin cases and only one-half of the controls had converted their sputum to a negative state, while one-fifth of the streptomycin cases and one-half of the controls in this category had died.

X-ray Change

The methods, terminology, and definitions used for the X-ray evaluation were developed with the assistance of the Evaluation Policy Committee of the Study Section and were tried, amended, and approved by that group before their final use.

The comparison of the two groups of cases presented thus far has been on the basis of objective measurable evidence. The X-ray films, although recognized as probably the most valuable single tool in the study and treatment of tuberculosis, present unique problems for analysis. These difficulties are of several kinds, and the attempts, though imperfect, to deal with each are described.

Unlike the clinical evidence, no measured scale exists for reading X-rays. Serial chest X-rays are usually interpreted only in terms of change from a previous film. The status at selection represents the earliest point from which change in this study can be measured. However, status at selection is not the same for all cases, and, even though not satisfactorily measurable, can be assumed to cover a scale ranging from one extreme to the other. Certainly, it is reasonable to assume that the potentialities for improvement or for deterioration are affected by the position on the scale occupied by any particular case at the time of selection for study. Some clues as to the distribution of the two groups of cases may be obtained from certain descriptive judgments about each case on the basis of the clinical and X-ray data available at the time the case was selected for study. The data on predominant morphology, cavitation, dynamics, and course presented in table 1 give an indication of the factors influencing the distribution of the two groups of cases and establish a crude base line against which future change can be measured.

In this analysis, the existence of disagreement in the interpretation of films has been recognized and an attempt has been made to minimize its effect upon the results. Clinicians with wide experience both in the management of tuberculous patients and in the interpretation of X-ray films were asked to participate as evaluators or jurors in the X-ray evaluation of the case material, to translate a combination of shadows on the film into an opinion of the significance of those shadows. The complete task of evaluation was accomplished in a series of five panels of 2 days each. Each case reviewed at a given panel was assigned to four evaluators selected at random from the panel of eight. Each saw the same number of streptomycin cases as of control cases. He read each case independently and without knowing whether the films were of a streptomycin or a control case.

Four factors were introduced into the evaluation in an attempt to narrow the range of the inherent subjective element. First, the terminology in which judgments were expressed was prescribed and defined. Second, judgments were made separately for the upper, middle, and lower thirds of each lung, to localize the area covered by the opinion. Third, the length of time between the selection and subsequent film was not known by the evaluators; thus, judgments of the amount of change were not influenced by knowledge of the time in which it occurred. Fourth, X-ray judgments independent of any knowledge of the clinical course were made, as well as subsequent opinions based on all the material available. The analysis presented in this preliminary paper is based on judgments of X-rays only.

Comparison of the four opinions of X-ray change on each case revealed a lack of agreement on a large number of cases. Although disagreement was slight for many cases, there were other cases for which all four doctors gave different opinions, as well as cases rated at opposite ends of the scale by different doctors.

The nature of the case material, the type of question, and the area of the lungs are among the factors being analyzed for later presentation with respect to the nature and extent of the disagreement.

The present paper does not deal at any length with the problem of disagreement but takes cognizance only of its existence as a factor complicating the analyses. Since the scale of change is not a numerical one, it is not possible to average the four independent opinions on each case to arrive at a case opinion. Therefore, in this paper, the simple summations of all judgments (four for each case) are presented for each group in table 8, figure 2, and appendix table 3. The percentage distributions of these judgments are then taken as summaries of the change in status of the treated and control groups.

Table 8. *Percentage distribution of opinions of X-ray changes in the streptomycin and control groups at each report period by degree of change*

Change from selection to:	Total[1]	Degree of change							
		Improvement			No change	Deterioration			
		Marked	Moderate	Slight		Slight	Moderate	Marked	Dead
Streptomycin group									
3 months	100.0	7.1	25.0	37.3	15.9	7.4	3.9	1.8	1.6
6 months	100.0	12.8	29.1	29.7	8.9	7.4	4.9	3.9	3.3
9 months	100.0	16.1	28.6	23.0	9.1	7.5	5.3	4.0	6.4
12 months	100.0	18.1	27.2	22.7	6.9	6.0	4.5	4.4	10.2
Control group									
3 months	100.0	2.0	8.9	26.5	25.1	16.9	10.1	5.9	4.6
6 months	100.0	3.4	12.8	26.5	15.6	12.4	10.7	6.7	11.9
9 months	100.0	6.0	15.4	24.0	10.2	9.4	11.0	6.5	17.5
12 months	100.0	7.4	17.4	19.2	8.4	9.4	8.1	7.7	22.4

[1] Based on available opinions.

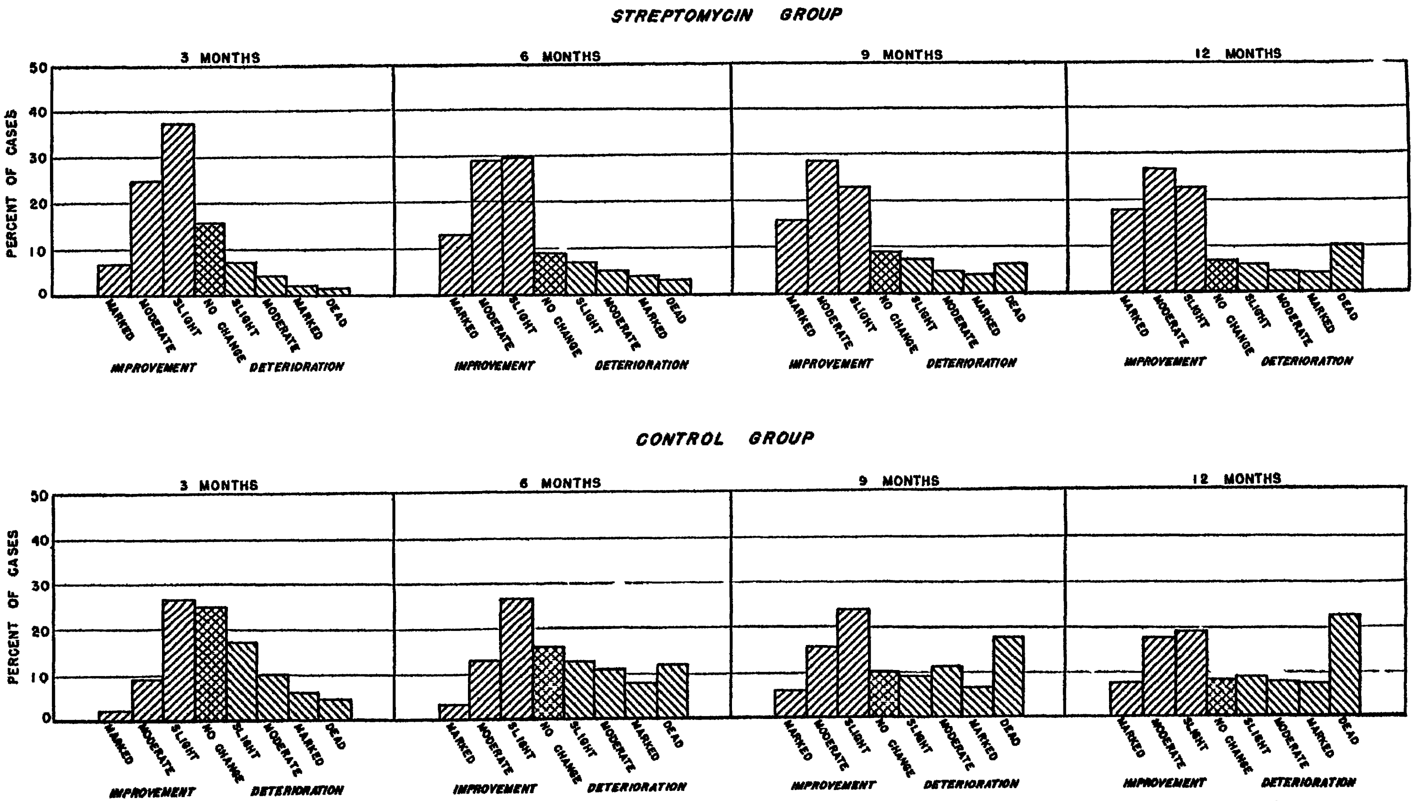

Figure 2. Percentage distribution of opinions of X-ray change in the streptomycin and control groups at each report period, by degree of chan

In a consideration of X-ray change, all cases in the streptomycin and control groups may be thought of as beginning the year of observation at the midpoint of the figure. The possibilities for change with time are in two directions: improvement of the disease shows on the right side of the chart as three degrees of getting better, and worsening of the disease shows on the left side of the chart as four degrees of getting worse. Death has been classified as the ultimate, or fourth degree, in worsening. This midpoint from which the two groups dispersed during the period of study is designated in the histograms as the "no change" point.

Inspection at the end of 3 months shows nearly seven-tenths of the streptomycin group improved to varying degrees, and the remaining three-tenths about equally divided between those remaining unchanged and those moving into the "worse" categories. The controls, on the other hand, showed equal proportions getting better and getting worse and one-quarter remaining unchanged at the end of 3 months.

After 6 months, again about seven-tenths of the streptomycin group were better, although now there was a greater concentration of patients in the more marked degrees of improvement than at 3 months. But of the remaining three-tenths of the streptomycin group, only one-tenth remained at the "no change" point while two-tenths were worse than at the beginning. The controls, at 6 months, continued to be equally dispersed on both sides of the "no change" point, although the size of the "no change" group decreased slightly as equal proportions improved or deteriorated.

At 9 months, the streptomycin group presented substantially the same picture as at 6 months, about seven-tenths better, one-tenth unchanged, and two-tenths worse. The controls continued their slower rate of change and by 9 months also showed only one-tenth still in the "unchanged" group. However, the movement from the "no change" group in the controls was again almost equally divided between the better and worse categories.

At the end of 12 months, the distribution for the streptomycin group was practically unchanged, nearly seven-tenths improved, less than one-tenth unchanged, and slightly more than two-tenths worse. Among the controls, the size of the "unchanged" group was, as at 9 months, approximately the same as in the streptomycin group, and roughly 45 percent of the cases were better and 45 percent worse.

The data on these four time periods might be summarized thus: in the streptomycin group, about seven-tenths of the group had improved by the end of 3 months. Within this improved group there was, during the 6-, 9-, and 12-month periods, a gradual shift to the right—that is, continued improvement. The proportion showing no change from the beginning of the study decreased from 16 percent at 3 months to about 7 percent at the end of 12 months. The proportion showing deterioration increased very slowly as the "no change" group decreased.

Among the controls, change was much slower and less dramatic. At the end of 3 months, one-quarter of the controls were still unchanged, with a gradual decline to about one-tenth still unchanged at the end of 1 year.

The controls are noteworthy, however, for the equality of movement toward improvement and deterioration. For all four time periods, about the same proportion of the controls was in the "better" categories as in the "worse" categories. However, when the degree of improvement or deterioration is considered, controls showing deterioration at 3 months showed a greater tendency to continue getting worse than for controls beginning to improve to continue improving.

The material in table 8 may be used in a slightly different way to compare the streptomycin and control groups. If the percentages in the marked and moderate X-ray improvement columns of the lower section of table 8 are combined, the two groups may be compared with respect to the proportions who improved significantly. In the streptomycin group, the percentages are 32, 42, 45 and 45, for the 3-, 6-, 9-, and 12-month periods, respectively. In the control group, the percentages are 11, 16, 21, and 25 for the 3-, 6-, 9-, and 12- month periods, respectively. The proportion in which significant X-ray improvement occurred from selection is considerably greater at every period among those receiving streptomycin, but it is interesting that with the passage of time there is a decrease in the ratio between the two groups. While almost three times as many streptomycin as control cases had shown significant X-ray improvement at the end of 3 months, the superiority gradually decreases until at 12 months there are not quite twice as many such cases among those who received streptomycin. The more favorable position of the streptomycin group seems due to an advantage gained during the actual period of drug therapy, the first 3 months.

Some indication of the nature of the differences in the X-ray changes in the two groups may be obtained by subdividing the groups according to the opinions on predominant morphology, dynamic status, and course of disease at the time of selection. Judgments on these points were not made retroactively on the basis of the behavior of a case, but instead were based only on the information available at the time each case was selected for study. This method of classification, while lacking the wisdom of hindsight, has the very practical advantage of coinciding with the basis on which such judgments must, of necessity, be made in the daily management of tuberculous cases. Thus, a case in which the disease appeared to be predominantly exudative at selection may have responded to therapy in such a fashion that "caseous" might have been a more appropriate initial classification.

Such cases undoubtedly existed in both the streptomycin and control groups. Yet it is of some interest to know what happened to cases which appeared initially to be predominantly exudative, or caseous, or fibrotic.

Table 9 and figures 3, 4, and 5 show the percentage distributions of the streptomycin and control groups over the scale of X-ray change at 12 months, within each classification of predominant morphology, dynamic status, and course of disease at selection. Comparison of the histograms in the first row in figure 3, showing the morphological categories in the streptomycin group, indicates more or less similar distributions of X-ray change for the exudative and caseous cases at the end of 1 year, with the exception of deaths, where the rate was almost twice as high for the caseous as for the exudative cases. The fibrotic cases differed from the others at both ends of the scale: fewer were markedly worse or dead and fewer were greatly improved; a much higher proportion remained stationary during the year.

In the second row of histograms, which shows the distributions in the control group, the similarity between the status of exudative and caseous cases at the end of the year is less marked. The exudative cases tended to shift to the significantly improved categories and the caseous cases to deteriorate. The fibrotic control cases showed much less movement from the no-change point in either direction than either the exudative or caseous cases. While a higher proportion of the fibrotic cases died than improved markedly, it is interesting that among the control group, nearly as many of the fibrotic cases showed marked improvement as of the exudative and caseous cases.

When each morphological class in the streptomycin group in the first row of histograms is compared with its counterpart among the controls in the second row, the streptomycin cases showed greater improvement for all three categories. The greatest differences between those who received streptomycin and those who did not appear to be among the predominantly fibrotic cases. However, this finding is based on extremely few observations and is at variance with impressions of many workers. Therefore, it must be investigated further on a larger body of material.

In the second section of table 9 and in figure 4, the streptomycin and control groups have been subdivided on the basis of dynamic status at time of selection, and the distributions of opinions of X-ray change at 12 months are shown separately for the acute, subacute, and chronic cases in the two groups. The relative positions of the three classes are very much the same for both groups. Judged by the proportion showing no X-ray change at the end of the year's observation, the tendency to move in one direction or the other was most marked among the acute cases in both the streptomycin and control groups. However, when the direction of change is considered,

Table 9. *Percentage distribution of opinions by degree of X-ray change in the streptomycin and control groups at the end of 12 months, classified by predominant morphology, dynamic status, and course of disease at selection*

Degree of X-ray change	Predominant morphology					
	Exudative		Caseous		Fibrotic	
	Sm	Control	Sm	Control	Sm	Control
Total [1]	100.0	100.0	100.0	100.0	100.0	100.0
Improvement:						
Marked	19.8	8.9	19.4	6.5	7.8	6.0
Moderate	27.3	21.5	27.3	15.2	26.5	12.1
Slight	24.8	21.8	19.7	17.1	27.5	18.2
No change	4.3	7.5	6.3	6.2	17.7	18.2
Deterioration:						
Slight	5.6	7.8	5.8	8.7	7.8	16.2
Moderate	6.5	5.5	2.5	9.9	5.9	10.1
Marked	4.0	6.5	5.1	8.7	2.9	8.1
Dead	7.7	20.5	13.9	27.7	3.9	11.1

Degree of X-ray change	Dynamic status					
	Acute		Subacute		Chronic	
	Sm	Control	Sm	Control	Sm	Control
Total [1]	100.0	100.0	100.0	100.0	100.0	100.0
Improvement:						
Marked	19.7	7.3	17.8	7.7	15.8	7.1
Moderate	25.2	16.8	30.4	19.6	24.2	14.2
Slight	19.4	15.7	23.1	22.8	27.9	18.7
No change	2.6	3.6	7.6	8.1	13.9	17.4
Deterioration.						
Slight	6.7	6.2	5.0	8.8	6.7	16.1
Moderate	5.7	8.8	3.8	7.4	3.6	8.4
Marked	6.7	7.7	2.9	8.4	3.0	6.5
Dead	14.0	33.9	9.4	17.2	4.9	11.6

Degree of X-ray change	Course of disease					
	Progressive		Stationary		Retrogressive	
	Sm	Control	Sm	Control	Sm	Control
Total [1]	100.0	100.0	100.0	100.0	100.0	100.0
Improvement:						
Marked	20.2	6.4	13.7	8.0	10.0	14.0
Moderate	27.9	17.7	25.9	14.9	22.5	22.8
Slight	19.3	17.5	27.9	22.9	45.0	21.1
No change	4.3	6.2	14.2	14.3	10.0	7.0
Deterioration:						
Slight	6.0	7.2	6.6	13.8	2.5	12.3
Moderate	5.0	8.3	3.6	6.9	2.5	10.5
Marked	5.1	7.9	2.0	9.6	5.0	---- ---- --
Dead	12.2	28.8	6.1	9.6	2.5	12.3

[1] Based on available opinions.

the subacute cases showed the highest percent with any improvement; the chronic cases were second, and acute cases, third. The death rate was highest among the acute cases, second among the subacute, and lowest among the chronic cases.

Although the three subdivisions of the streptomycin group according

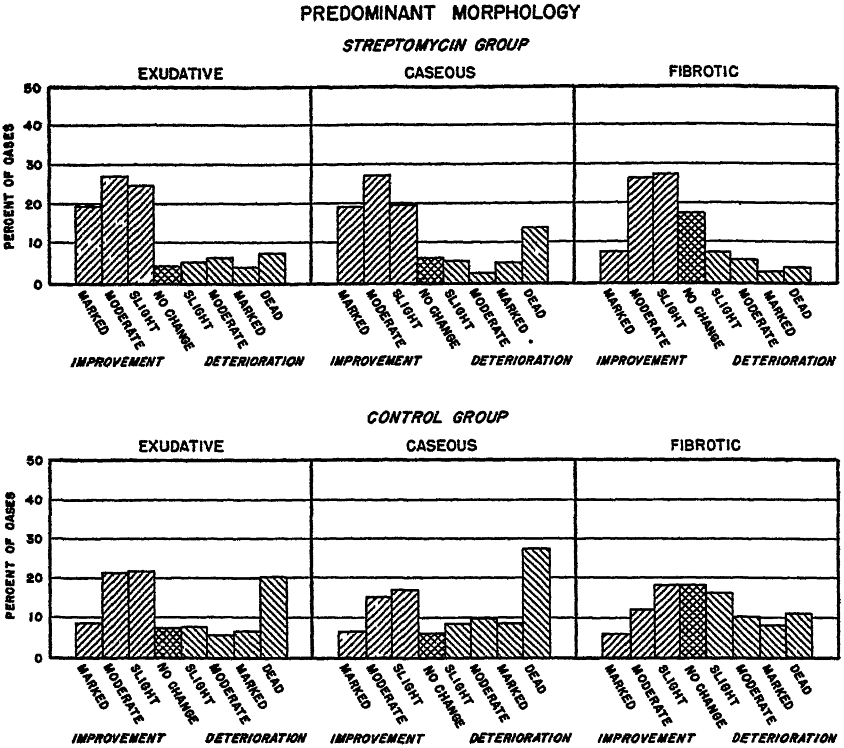

Figure 3. Percentage distribution of opinions by degree of X-ray change in the streptomycin and control groups at the end of 12 months, classified by predominant morphology at selection.

to dynamic status differ from each other in very much the same way as their counterparts among the controls, there are differences between the streptomycin and control members of each pair. This may be seen visually by pairing vertically the histograms in the two rows of figure 4. The effect of streptomycin appears to be most striking among the acute cases. The death rate was two and one-half times as high among the acute cases who had not received streptomycin (33.9 percent) as among those who had been treated with the drug (13.7 percent), while the proportion of those showing X-ray improvement was only slightly more than one-half as large. The subacute and chronic cases who received streptomycin also showed a lower death rate and a larger proportion improved, but the contrasts were not so sharp.

Figure 5 and the third section of table 9 show the distribution of opinions on X-ray change at 12 months in the streptomycin and control groups after the two groups of cases have been subdivided according to course of disease at time of selection for study. The histograms for the "progressive" cases in both the streptomycin and control groups

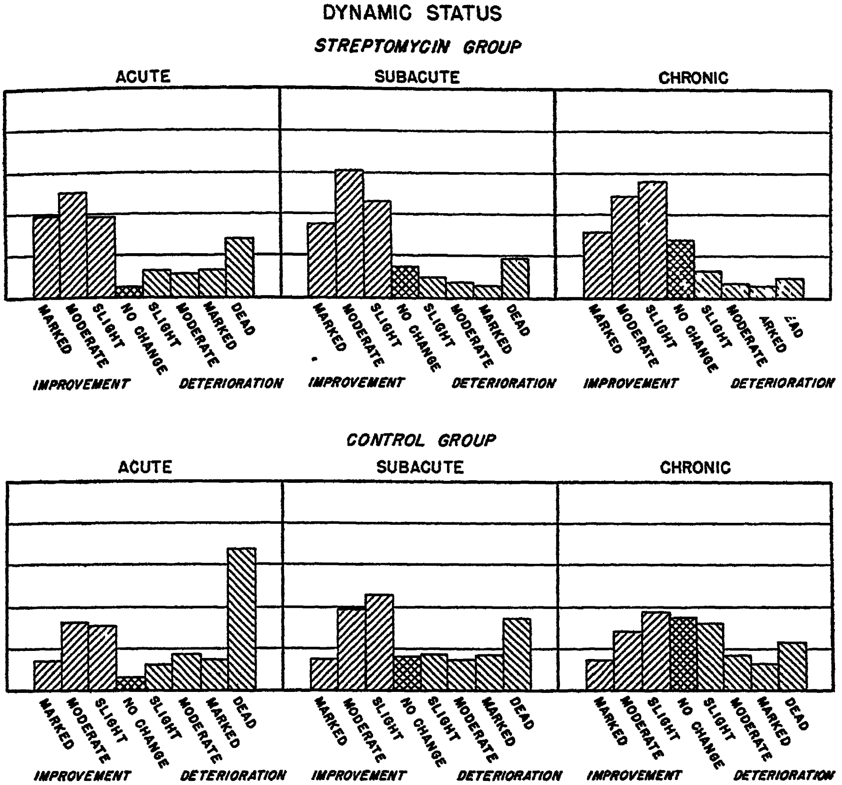

Figure 4. Percentage distribution of opinions by degree of X-ray change in the streptomycin and control groups at the end of 12 months, classified by dynamic status at selection.

are almost identical with those shown above for acute cases, and the distributions for "stationary" cases correspond closely with those for chronic cases above. While a larger proportion of the stationary cases in both groups improved than of the progressive cases, differences between those who received streptomycin and those who did not are more marked for the progressive cases because of the large proportion of deaths in the progressive controls. The retrogressive groups are too small to provide definitive comparisons.

Discussion

This cooperative study has demonstrated the value of the addition of streptomycin to other therapy in pulmonary tuberculosis. The results of the controlled investigation show that during the 12 months of observation, greater improvement occurred among the patients who received streptomycin in addition to other forms of therapy. The differences between the streptomycin and control groups are very marked with respect to both the time factor and extent. By the

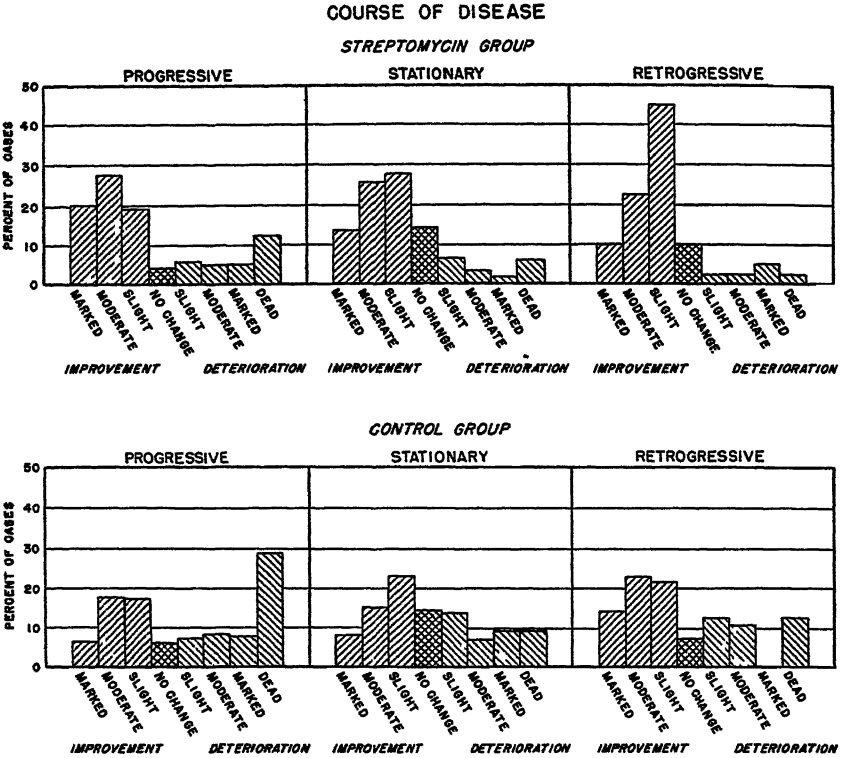

Figure 5. **Percentage distribution of opinions by degree of X-ray change in the streptomycin and control groups at the end of 12 months, classified by course of disease at selection.**

end of 3 months, a large proportion of the cases receiving streptomycin had improved as compared with a much smaller proportion of those who received only conventional therapy. Additional cases in each group showed improvement at the end of 6-, 9-, and 12-month observations. Although the differences between the two groups decrease with the passage of time, the control group never overcomes the advantage gained by the streptomycin group during the first 3 months, and the superiority of those who received streptomycin is still marked at the end of 12-months' observation.

Even though the findings are based on relatively small numbers for many of the subdivisions of the material, the consistent superiority of the streptomycin group on all measures, clinical, bacteriological, and radiological, and at all points in time, constitutes definitive evidence of the usefulness of streptomycin when added to other treatment of pulmonary tuberculosis. The possible bias which exists in the analysis because of treatment of the lost cases was mentioned earlier in the paper. It should, perhaps, be pointed out that although this bias favored the control group, the results showed the streptomycin group consistently superior on all measures. Therefore, it is evident that the differences between the two groups have not been produced by the bias, but that the true differences are probably somewhat larger.

A theory developed and presented in connection with the interpretation of tuberculin sensitivity may be applied in a slightly different way to this material. The concept was presented that a given population may consist of two distinct components distributed in such a fashion that there is an overlapping which produces a doubtful group. A population of tuberculous patients might also be thought of as having two quite separate components and a third group lying midway between, with respect to inherent constitutional factors influencing the course of the disease. In figures 1 and 2, a certain pattern of change can be observed over and over: both the streptomycin and control groups move away from the "no change" or starting point toward the two extremes with the passage of time. The material suggests the possibility that, even at the beginning of the investigation, there were certain cases among those studied which, it will be recalled, included only moderately and far advanced cases which were going to improve and certain others which were going to deteriorate, while for a third group, the "doubtful" cases, the direction of change was in the balance.

One interpretation of these findings might be that the superiority of the streptomycin cases has been produced by a quite different action of the drug on the three groups. For those who were going to improve, the rate of improvement appeared to have been accelerated by the addition of streptomycin. For those who were going to become worse streptomycin slowed the rate of deterioration and delayed death. Finally, the possible result of streptomycin in the "doubtful" group may be considered. In these cases, it could be that the factors of host resistance and conventional therapy were so closely matched against the severity of the infection that the outcome was in doubt. The addition of the drug could have swung the balance with the result that these "doubtful" cases in the streptomycin group improved, while among their counterparts in the control group some improved and some deteriorated. A clearer understanding of the nature of the "doubtful" cases for which streptomycin may be the decisive factor may emerge from further analysis of the material.

Summary

A group investigation under the direction of the Tuberculosis Study Section of the Division of Research Grants and Fellowships to determine the effect of adding streptomycin to other therapy in

pulmonary tuberculosis was concluded in March 1950. Tuberculosis clinicians in 12 hospitals in different parts of the country carried out a joint investigation by managing their cases under a common protocol. Five hundred and forty-one cases of pulmonary tuberculosis were divided at random into two groups for which all forms of conventional therapy or surgery were permissible. The variable under investigation, streptomycin, was given only to one group.

The two groups have been compared in this first paper on only the most important measures of change; later reports will contain material on bacterial resistance and toxicity in the streptomycin group. The principal findings may be summarized:

1. At the beginning of the study, the two groups were similar.
2. By the end of 3 months, the length of drug therapy, improvement had occurred in a much larger proportion of the streptomycin group.
3. At each succeeding point in time at which the two groups were compared, the superiority of the streptomycin group was marked, although the differences between the two groups became somewhat smaller.
4. The more favorable position of the cases who received streptomycin is evident for all measures on which the two groups were compared, namely, temperature, body weight, bacteriological status, amount of sputum and X-ray change.

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APPENDIX

Table 1. *Initial characteristics of cases under observation at each report period (percent of group)*

Characteristics and treatment		Selection		3 months		6 months		9 months		12 months	
		Sm	Control	Sm	Control	Sm	Control	Sm	Control	Sm	Control
Race	White	59.6	62.0	59.2	61.1	59.5	60.4	58.2	58.6	58.0	58.7
	Nonwhite	40.4	38.0	40.8	38.9	40.5	39.6	41.8	41.4	42.0	41.3
Sex	Male	53.0	53.1	53.1	54.1	52.5	54.2	52.0	53.6	51.3	53.1
	Female	47.0	46.9	46.9	45.9	47.5	45.8	48.0	46.4	48.7	46.9
Age	Under 25	27.0	28.4	27.5	27.6	27.6	28.3	28.7	30.0	30.1	28.6
	25–44	54.8	51.3	54.2	51.8	54.5	50.4	53.7	50.0	53.5	52.0
	45 and over	18.2	20.3	18.3	20.6	17.9	21.3	17.6	20.0	16.4	19.4
Length of present hospitalization	Less than 3 months	63.6	55.0	62.5	56.0	62.5	55.4	61.7	55.4	62.8	58.2
	3–5 months	12.6	16.2	13.0	16.7	12.9	17.1	12.3	16.8	12.4	13.8
	6–11 months	15.6	16.6	16.1	14.8	16.0	14.6	16.9	15.5	15.5	15.8
	1 year or more	8.2	12.2	8.4	12.5	8.6	12.9	9.1	12.3	9.3	12.2
Temperature	Markedly febrile	18.5	19.2	19.1	19.1	19.5	18.7	20.1	18.2	20.8	18.4
	Slightly febrile	50.0	43.9	50.4	43.9	50.5	44.2	51.6	45.9	52.7	44.4
	Afebrile	31.5	36.9	30.5	37.0	30.0	37.1	28.3	35.9	26.5	37.2
Body weight	Normal or overweight	24.4	24.6	24.5	25.0	24.2	24.9	23.7	25.1	23.3	20.3
	Underweight	75.6	75.4	75.5	75.0	75.8	75.1	76.3	74.9	76.7	79.7
Amount of sputum	None	28.8	27.2	28.6	26.7	28.0	27.3	27.8	27.5	26.9	24.7
	Slight	27.4	30.6	27.0	30.2	27.5	30.7	26.6	29.8	27.3	29.9
	Moderate	34.8	34.7	35.1	35.3	35.4	34.4	36.5	35.3	35.9	37.1
	Copious	9.0	7.5	9.3	7.8	9.1	7.6	9.1	7.4	9.9	8.3
Previous streptomycin therapy.	Streptomycin	4.4	3.3	4.6	3.1	4.7	3.3	4.9	3.6	5.3	4.1
	No streptomycin	95.6	96.7	95.4	96.9	95.3	96.7	95.1	96.4	94.7	95.9
Surgery or collapse procedures in effect.[1]	None	79 2	73.0	78.0	71.5	77.2	69.3	76.1	66.2	76.3	64.5
	Pneumothorax	8.0	8.6	8.7	8.7	9.1	9.2	9.4	10.4	9.0	11.0
	Pneumoperitoneum	9.1	10.1	9.5	10.7	9.8	11.4	10.2	12.9	10.4	14.0
	Thoracoplasty	2.2	6.1	2.3	6.7	2.4	7.5	2.6	7.5	2.4	7.0
	Phrenic nerve operation	1.5	2.2	1.5	2.4	1.5	2.6	1.7	3.0	1.9	3.5
Stage of disease	Moderately advanced	34.3	34.7	33.8	34.3	33.3	34.9	33.3	34.6	31.7	31.5
	Far advanced	65.7	65.3	66.2	65.7	66.7	65.1	66.7	65.4	68.3	68.5
Predominant morphology.	Exudative	38.7	41.2	38.4	40.8	37.9	40.0	37.9	39.4	38.2	39.9
	Caseous	48.6	44.7	48.7	44.6	49.3	45.3	48.9	46.4	49.5	45.8
	Fibrotic	12.7	14.1	12.9	14.6	12.8	14.7	13.2	14.2	12.3	14.3
Dynamics	Acute	36.5	35.8	37.0	35.7	36.9	35.5	37.2	35.6	38.7	37.2
	Subacute	41.4	42.3	40.7	42.1	40.9	42.0	41.1	42.8	41.6	41.0
	Chronic	22.1	21.9	22.3	22.2	22.2	22.5	21.7	21.6	19.7	21.8
Course	Progressive	68.8	63.5	69.5	63.8	69.7	63.6	69.6	64.4	71.0	64.9
	Stationary	25.4	28.1	24.4	27.9	24.6	27.7	24.4	26.8	23.8	26.7
	Retrogressive	5.8	8.4	6.1	8.3	5.7	8.7	6.0	8.8	5.2	8.4
Cavitation	Definitely present	83.5	84.8	16.3	14.5	16.2	14.1	15.8	13.7	14.7	14.5
	Not present	16.5	15.2	83.7	85.5	83.8	85.9	84.2	86.3	85.3	84.5

[1] Cases receiving more than one form of surgery or collapse procedure are duplicated.

APPENDIX—Continued

Table 2. *Actual distribution of streptomycin and control cases at each report period*

A. TEMPERATURE

	Total		Afebrile		Slightly febrile		Markedly febrile		Dead		Not available	
	Sm	Control	Sm	Control	Sm	Control	Sm	Control	Sm	Control	Sm	Control
Selection	270	271	85	100	135	119	50	52	------	------	------	------
3 months	270	271	165	114	78	89	15	38	4	11	8	19
6 months	270	271	147	109	78	71	15	22	8	26	22	43
9 months	270	271	148	98	60	57	10	19	14	35	38	62
12 months	270	271	128	86	52	49	9	6	21	40	60	90

B. BODY WEIGHT

	Total		Normal or overweight		Underweight		Dead		Not available	
	Sm	Control	Sm	Control	Sm	Control	Sm	Control	Sm	Control
Selection	270	271	63	60	195	184	------	------	12	27
3 months	270	271	97	76	143	139	4	11	26	45
6 months	270	271	112	70	114	114	8	26	36	61
9 months	270	271	106	72	97	84	14	35	53	80
12 months	270	271	92	62	92	73	21	40	65	96

C. AMOUNT OF SPUTUM

	Total		Very slight		Slight		Moderate		Copious		Dead		Not available	
	Sm	Control	Sm	Control	Sm	Control	Sm	Control	Sm	Control	Sm	Control	Sm	Control
Selection	270	271	77	73	73	82	93	93	24	20	-----	-----	3	3
3 months	270	271	110	77	82	66	48	70	16	20	4	11	10	27
6 months	270	271	107	85	65	35	49	63	15	16	8	26	26	46
9 months	270	271	107	69	50	38	41	49	15	9	14	35	43	71
12 months	270	271	104	57	34	37	40	32	9	12	21	40	62	93

D. BACTERIOLOGICAL STATUS

	Total		Negative		Positive		Dead		Not available	
	Sm	Control	Sm	Control	Sm	Control	Sm	Control	Sm	Control
Selection	270	271	9	7	260	258	------	------	1	6
3 months	270	271	61	40	194	198	4	11	11	22
6 months	270	271	88	50	156	155	8	26	18	40
9 months	270	271	81	49	137	130	14	35	38	57
12 months	270	271	81	46	110	102	21	40	58	83

APPENDIX—Continued

Table 3. *Actual distribution of opinions of X-ray change in the streptomycin and control groups at each report period by degree of change*

	Total	Degree of change								Not available
		Improvement			No change	Deterioration				
		Marked	Moderate	Slight		Slight	Moderate	Marked	Dead	
Streptomycin group										
3 months	1,080	72	252	376	161	75	39	18	16	71
6 months	1,080	122	278	284	85	71	47	37	32	124
9 months	1,080	141	251	202	80	66	47	35	56	202
12 months	1,080	149	223	186	57	49	37	36	84	259
Control group										
3 months	1,084	19	85	254	240	162	97	56	44	127
6 months	1,084	30	112	233	137	109	94	59	104	206
9 months	1,084	48	123	192	82	75	88	52	140	284
12 months	1,084	53	124	137	60	67	58	55	160	370

Table 4. *Actual distribution of opinions on degree of X-ray change in the streptomycin and control groups at the end of 12 months classified by predominant morphology, dynamic status and course of disease at selection*

Degree of X-ray change	Predominant morphology							
	Total		Exudative		Caseous		Fibrotic	
	Sm	Control	Sm	Control	Sm	Control	Sm	Control
Total	1,080	1,084	418	447	525	484	137	153
Improvement:								
Marked	149	53	64	26	77	21	8	6
Moderate	223	124	88	63	108	49	27	12
Slight	186	137	80	64	78	55	28	18
No change	57	60	14	22	25	20	18	18
Deterioration:								
Slight	49	67	18	23	23	28	8	16
Moderate	37	58	21	16	10	32	6	10
Marked	36	55	13	19	20	28	3	8
Dead	84	160	25	60	55	89	4	11
Not available	259	370	95	154	129	162	35	54

Degree of X-ray change	Dynamic status							
	Total		Acute		Subacute		Chronic	
	Sm	Control	Sm	Control	Sm	Control	Sm	Control
Total	1,080	1,084	394	388	447	459	239	237
Improvement:								
Marked	149	53	62	20	61	22	26	11
Moderate	223	124	79	46	104	56	40	22
Slight	186	137	61	43	79	65	46	29
No change	57	60	8	10	26	23	23	27
Deterioration:								
Slight	49	67	21	17	17	25	11	25
Moderate	37	58	18	24	13	21	6	13
Marked	36	55	21	21	10	24	5	10
Dead	84	160	44	93	32	49	8	18
Not available	259	370	80	114	105	174	74	82

Table 4. *Actual distribution of opinions on degree of X-ray change in the streptomycin and control groups at the end of 12 months classified by predominant morphology, dynamic status and course of disease at selection*—Continued

Degree of X-ray change	Course							
	Total		Progressive		Stationary		Retrogressive	
	Sm	Control	Sm	Control	Sm	Control	Sm	Control
Total	1,080	1,084	743	688	274	305	63	91
Improvement:								
Marked	149	53	118	30	27	15	4	8
Moderate	223	124	163	83	51	28	9	13
Slight	186	137	113	82	55	43	18	12
No change	57	60	25	29	28	27	4	4
Deterioration:								
Slight	49	67	35	34	13	26	1	7
Moderate	37	58	29	39	7	13	1	6
Marked	36	55	30	37	4	18	2	----------
Dead	84	160	71	135	12	18	1	7
Not available	259	370	159	219	77	117	23	34

—Announcement—

Handbook for Photofluorographic Operators

When the Brazilian, DeAbreu, first demonstrated the mass use of photofluorography in 1938, the world little imagined that the brief span of 12 years would see it grow to its present usefulness. During the one year of 1949, more than 14 million persons in the United States alone were screened for tuberculosis by chest photofluorography, and mass survey activities are continuing to expand all over the country.

As a means of facilitating its own part in the vast tuberculosis case-finding program of today, the Public Health Service, through its Division of Tuberculosis, has produced a "Handbook for Photofluorographic Operators" as a technical guide for its own photofluorographic field teams. The publication outlines the principles of photofluorography in simple terms, describes the components and characteristics of photofluorographic machines, and presents detailed operating instructions for the most commonly used types of equipment. Photofluorographic film processing instructions are also given, as well as directions for adjusting and testing equipment. The final chapter of the handbook discusses the all-important subject of radiation hazards and protective measures. Illustrations are numerous and include both photographs and schematic diagrams of photofluorographic equipment.

Although the manual has been written expressly for the use of Public Health Service photofluorographic personnel, it will serve as a useful reference guide for all users and operators of photofluorographic equipment. Copies are now available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., at 45 cents each.

Incidence of Disease

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

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UNITED STATES

Reports From States for Week Ended October 14, 1950

New cases of acute poliomyelitis reported in the United States during the current week numbered 1,598, a 12 percent decrease from the 1,815 cases reported for the preceding week. This is the third consecutive week since May 20 that a decrease from the preceding week has been reported. The figure for this week is higher than the corresponding number (1,204) for 1949. The peak incidence of this disease to date occurred the week ended September 23, the latest week in any year during the past 20 years, with the exception of 1932. The cumulative total of 23,815 for the current "disease" year was below the corresponding total of 35,000 for last year, the highest on record. The "disease" year for acute poliomyelitis begins with the twelfth week of the calendar year. The cumulative total for the calendar year was 24,947, compared with the total of 35,913 for the corresponding period last year.

Comparative Data for Cases of Specified Reportable Diseases: United States

[Numbers after diseases are International List numbers, 1948 revision]

Disease	Total for week ended		5-year median 1945-49	Seasonal low week	Cumulative total since seasonal low week		5-year median 1944-45 through 1948-49	Cumulative total for calendar year		5-year median 1945-49
	Oct. 14, 1950	Oct. 15, 1949			1949-50	1948-49		1950	1949	
Anthrax (062)	3	------	(1)	(1)	(1)	(1)	(1)	36	41	(1)
Diphtheria (055)	171	241	341	27th	1,347	1,968	2,507	4,475	5,736	8,804
Acute infectious encephalitis (082)	27	19	10	(1)	(1)	(1)	(1)	763	632	515
Influenza (480-483)	1,668	1,082	1,473	30th	11,077	8,072	8,531	257,336	83,939	150,301
Measles (085)	698	605	814	35th	3,606	3,132	3,725	291,777	591,650	556,636
Meningococcal meningitis (057.0)	69	49	58	37th	226	189	189	3,025	2,705	2,823
Pneumonia (490-493)	895	1,066	-------	(1)	(1)	(1)	(1)	66,780	62,765	--------
Acute poliomyelitis (080)	1,598	1,204	1,042	11th	[2]23,815	35,000	20,219	[2]24,947	35,913	20,686
Rocky Mountain spotted fever (104)	10	6	6	(1)	(1)	(1)	(1)	441	541	526
Scarlet fever (050)	659	790	963	32d	3,576	3,878	4,778	43,746	61,544	66,773
Smallpox (084)	------	------	-------	35th	1	3	4	27	44	151
Tularemia (059)	6	15	15	(1)	(1)	(1)	(1)	745	935	784
Typhoid and paratyphoid fever (040, 041) [3]	76	76	98	11th	2,332	2,794	2,794	2,842	3,282	3,282
Whooping cough (056)	1,328	1,289	1,435	39th	2,905	2,809	3,024	100,100	49,411	78,899

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[1] Not computed. [2] Deductions: Michigan, weeks ended September 2, and October 7, 1 case each
[3] Including cases reported as salmonellosis.

For the current week, seven of the total of nine geographic divisions decreased from the preceding week. These decreases ranged from 114 (440 to 326) cases of acute poliomyelitis reported in the Middle Atlantic States to 1 (95 to 94) in the West South Central States. The East South Central States increased 1 case (91 to 92) and the Mountain States increased by 33 (28 to 61).

For the current week, the States reporting the largest number of cases were: New York (205), Ohio (125), Michigan (115), Illinois (100), Pennsylvania (77), and Maryland and Texas (70 each).

Alaska reported 9 cases compared with 16 last week. The cumulative total for the calendar year was 40. Hawaii reported 1 case for the week.

For the Nation, the total number of reported cases of scarlet fever for the current week was 659 which may be compared with 586 cases reported last week, and 790 cases reported for the corresponding week last year. The 5-year (1945–49) median was 963 cases.

The cumulative total number of reported cases of scarlet fever for the current "disease" year was 3,576 which may be compared with 3,878 for the corresponding period last year and 4,778 for the 5-year median. This is the lowest cumulative total number of cases of scarlet fever reported for corresponding periods since the "disease" year beginning in 1943.

The total number of cases of meningococcal meningitis reported for the week was 69 compared with 44 last week and 49 for the corresponding period last year. For the calendar year, a total of 3,025 cases was reported, the highest total number reported for corresponding periods in the past 3 years.

No smallpox was reported in the United States. Three cases of anthrax were reported, one in New Jersey and two in Pennsylvania.

Deaths During Week Ended October 14, 1950

	Week ended October 14, 1950	*Corresponding week, 1949*
Data for 94 large cities of the United States:		
Total deaths	8, 931	8, 750
Median for 3 prior years	8, 750	----------
Total deaths, first 41 weeks of year	375, 641	375, 626
Deaths under 1 year of age	577	668
Median for 3 prior years	668	----------
Deaths under 1 year of age, first 41 weeks of year	25, 495	26, 851
Data from industrial insurance companies:		
Policies in force	26, 552, 365	70, 084, 532
Number of death claims	8, 345	9, 423
Death claims per 1,000 policies in force, annual rate	6. 3	7. 0
Death claims per 1,000 policies, first 41 weeks of year, annual rate	9. 2	9. 1

Reported Cases of Selected Communicable Diseases: United States, Week Ended October 14, 1950

[Numbers under diseases are International List numbers, 1948 revision]

Area	Diphtheria (055)	Encephalitis, infectious (082)	Influenza (480–483)	Measles (085)	Meningitis, meningococcal (057 0)	Pneumonia (490–493)	Poliomyelitis (080)
United States	**171**	**27**	**1,668**	**698**	**69**	**895**	**1,598**
New England	**5**	**1**		**46**	**4**	**33**	**60**
Maine				4	1	9	4
New Hampshire							
Vermont				1			2
Massachusetts	5	1		27	1		21
Rhode Island				8	1		1
Connecticut				6	1	24	32
Middle Atlantic	**7**	**7**	**2**	**162**	**11**	**188**	**326**
New York	4	7	[1] 1	45	3	111	205
New Jersey			1	59	1	32	44
Pennsylvania	3			58	7	45	77
East North Central	**11**	**1**	**22**	**136**	**18**	**89**	**459**
Ohio	2		2	18	5		125
Indiana	6			2		5	54
Illinois	2			9	5	42	100
Michigan			1	27	8	38	115
Wisconsin	1	1	19	80		4	65
West North Central	**4**	**1**	**1**	**49**	**7**	**25**	**163**
Minnesota	3		1	7			28
Iowa				4	1	1	57
Missouri				16	2	9	28
North Dakota				1		11	2
South Dakota		1		14	1		3
Nebraska				2	1		22
Kansas	1			5	2	4	23
South Atlantic	**65**	**1**	**419**	**31**	**8**	**229**	**224**
Delaware				2			2
Maryland	1			4		16	70
District of Columbia			1			13	10
Virginia	12		335	4	2	42	51
West Virginia	5		36	5	1	5	12
North Carolina	8	1		2	3		28
South Carolina	11		22	1		10	8
Georgia	27		16	12	2	129	23
Florida	1		9	1		14	20
East South Central	**34**	**2**	**25**	**66**	**12**	**40**	**92**
Kentucky	12			53	5	5	40
Tennessee	4	2	24	8	6		25
Alabama	12			4		18	9
Mississippi	6		1	1	1	17	18
West South Central	**32**	**1**	**1,191**	**67**	**2**	**235**	**94**
Arkansas	6		110	8		16	6
Louisiana	4			1		14	9
Oklahoma	3		57	7		14	9
Texas	19	1	934	51	2	191	70
Mountain	**7**		**80**	**50**	**3**	**26**	**61**
Montana	3		12	3	1		2
Idaho	2		6	13		8	18
Wyoming							2
Colorado	1		16	11	2	7	15
New Mexico	1			1		4	7
Arizona			46	3		7	13
Utah				19			4
Nevada							
Pacific	**6**	**13**	**18**	**91**	**4**	**30**	**119**
Washington	1		14	26	2		24
Oregon	1		2	8	1	15	29
California	4	13	2	57	1	15	66
Alaska			6			1	9
Hawaii			162	2			1

[1] New York City only.

Anthrax: New Jersey, 1 case; Pennsylvania, 2 cases.

Reported Cases of Selected Communicable Diseases: United States, Week Ended October 14, 1950—Continued

[Numbers after diseases are International List numbers, 1948 revision]

Area	Rocky Mountain spotted fever (104)	Scarlet fever (050)	Smallpox (084)	Tularemia (059)	Typhoid and paratyphoid fever[1] (040, 041)	Whooping cough (056)	Rabies in animals
United States	10	659		6	76	1,328	98
New England		41				190	
Maine		3				42	
New Hampshire						9	
Vermont		3				59	
Massachusetts		29				34	
Rhode Island						24	
Connecticut		6				22	
Middle Atlantic	1	90			11	251	28
New York		[2] 38			4	110	28
New Jersey		11				85	
Pennsylvania	1	41			7	56	
East North Central	1	154			7	372	7
Ohio	1	50			3	67	2
Indiana		16			1	46	
Illinois		22				21	4
Michigan		52			2	149	
Wisconsin		14			1	89	1
West North Central		24			4	72	3
Minnesota		8				11	1
Iowa		5				24	2
Missouri		3			3	2	
North Dakota		2				5	
South Dakota		1					
Nebraska		1			1	2	
Kansas		4				28	
South Atlantic	8	133		1	13	122	10
Delaware		2			3	1	
Maryland	1	6				20	
District of Columbia		2				2	
Virginia	7	20			2	31	
West Virginia		15			2	21	
North Carolina		63		1		30	
South Carolina		5			2	2	7
Georgia		15			3	13	3
Florida		5			1	2	
East South Central		93		4	12	58	21
Kentucky					2	13	11
Tennessee		65		2	2	28	4
Alabama		17			4	12	5
Mississippi		11		2	4	5	1
West South Central		29			16	114	24
Arkansas		3			4	9	
Louisiana					5	1	
Oklahoma		9				6	1
Texas		17			7	98	23
Mountain		12		1	12	68	2
Montana		3			1	12	
Idaho					1	14	
Wyoming							
Colorado		3			1	26	2
New Mexico		1			6	3	
Arizona					2	7	
Utah		5			1	6	
Nevada				1			
Pacific		83			1	81	3
Washington		29				25	
Oregon		9				5	
California		45			1	51	3
Alaska							
Hawaii						1	

[1] Including cases reported as salmonellosis.

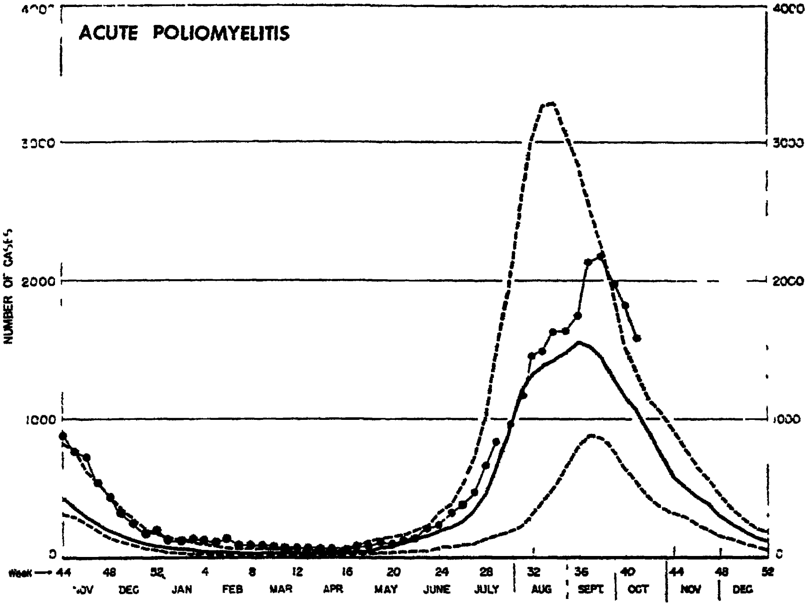
[2] Including cases reported as streptococcal sore throat.

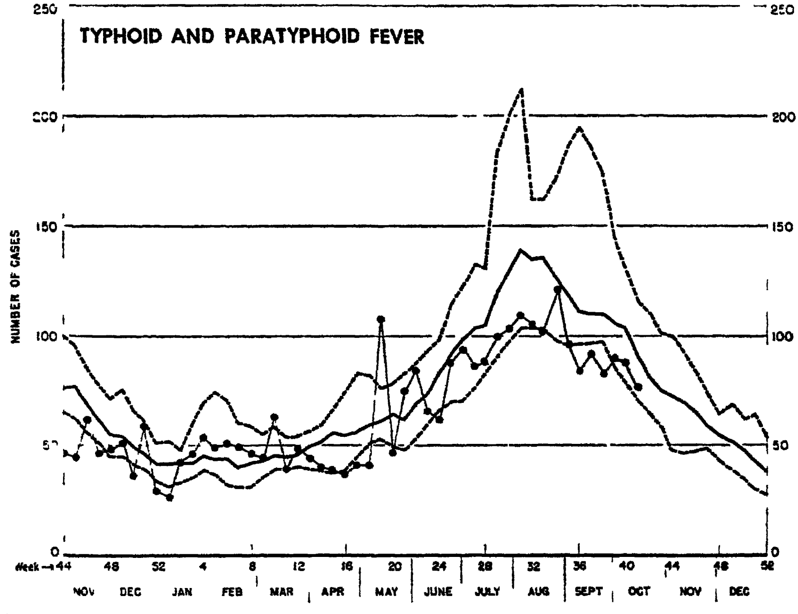
NOTE.—Correction for Wyoming, week ended Oct. 7, 9 reported for rabies in animals; change to none.

Rabies in man: North Carolina, 1 case.

Communicable Disease Charts

All reporting States, November 1949 through October 14, 1950





The upper and lower broken lines represent the highest and lowest figures recorded for the corresponding weeks in the 5 preceding years. The solid line is a median figure for the 5 preceding years. All three lines have been smoothed by a 3-week moving average. The dots represent numbers of cases reported for the weeks of 1950.

FOREIGN REPORTS

CANADA

Reported Cases of Certain Diseases—Week Ended Sept. 23, 1950

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Brucellosis					1	1				8	10
Chickenpox			5		25	45	7	14	16	19	131
Diphtheria					1	2	1				4
Dysentery, bacillary					10	6				2	18
Encephalitis, infectious								2			2
German measles			9		6	37		3	7	11	73
Influenza			47				4				51
Measles			8		276	49	4	9	7	8	361
Meningitis, meningococcal			1							1	2
Mumps			5		124	70	4	32	28	16	279
Poliomyelitis				1	1	24	1	13	9	4	53
Scarlet fever	4		3		23	16	3	13	10	4	76
Tuberculosis (all forms)	7		12	1	42	26	48	13		72	221
Typhoid and paratyphoid fever					13	2		1		2	18
Venereal diseases:											
Gonorrhea	7		7	15	71	47	29	16	49	98	339
Syphilis (total)	6		7	9	41	20	1	7	2	11	104
Primary				1	4	5		1	1		12
Secondary				4	3					1	8
Other	6		7	4	34	15	1	6	1	10	84
Whooping cough	1				92	135	6	2	5	48	289

FINLAND

Reported Cases of Certain Diseases—August 1950

Disease	Cases	Disease	Cases
Diphtheria	55	Scarlet fever	468
Dysentery	3	Typhoid fever	22
Malaria	1	Venereal diseases:	
Meningitis, meningococcal	8	Gonorrhea	695
Paratyphoid fever	176	Syphilis	30
Poliomyelitis	48		

JAMAICA

Reported Cases of Certain Diseases—5 Weeks Ended September 30, 1950

Disease	Kingston	Other localities	Total
Chickenpox	4	16	20
Diphtheria	1	1	2
Dysentery, unspecified	2	1	3
Leprosy		3	3
Ophthalmia neonatorum		1	1
Poliomyelitis		3	3
Puerperal sepsis		1	1
Scarlet fever		2	2
Tuberculosis, pulmonary	33	63	96
Typhoid fever	21	58	79
Typhus fever (murine)	2		2

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India. During the period September 24–October 7, 1950, 397 cases of cholera were reported in Madras.

Indochina. During the week ended September 9, 1950, one case of cholera was reported in the port of Saigon, Viet Nam. Two cases were reported in Central and Southern Viet Nam during the month of July, and three cases during the month of August.

Plague

Brazil. Brazilian health authorities reported one case of plague found on a ship which arrived October 1, 1950, at Santos from Rosario, Argentina.

Indochina. Twelve cases of plague, with 4 deaths, were reported in Central and Southern Viet Nam during the month of July 1950, and 7 cases with 3 deaths were reported in that area during the month of August.

Smallpox

British East Africa. Reports from Tanganyika on cases of smallpox were as follows: Week ended August 26, 1950, 288 cases; week ended September 2, 92 cases; week ended September 9, 141 cases. During this 3-week period 121 deaths occurred. These cases and deaths were chiefly in the Southern Province.

Dahomey. Sixty-two cases of smallpox were reported in Dahomey during the period September 11–30, 1950.

India (French). Smallpox was reported in Pondicherry as follows: Weeks ended September 9 and 16, 26 (16 deaths) and 12 cases, respectively.

Indonesia. For the week ended September 23, 1950, 47 cases of smallpox were reported in Bandjermasin, Borneo. Reported cases for the weeks ended September 9 and 16, were 38 and 31, respectively.

Togo (French). For the period September 11–30, 1950, 30 cases of smallpox with 9 deaths were reported in French Togo.

Typhus Fever

Egypt. One case of typhus fever was reported in Cairo during the week ended September 16, 1950, and one case during the week ended September 23.

Spain. During the week ended August 26, 1950, 3 cases of typhus fever were reported in Spain—2 in the City of Madrid and 1 in Huelva Province. During the week ended September 2, 6 cases were reported in Madrid, 1 in the port of Huelva, and 1 in Huelva Province.

Yellow Fever

Belgian Congo. On August 26, 1950, one fatal case of yellow fever was reported at Baye, a village north of Bondo, in Stanleyville Province.

Colombia. One death from yellow fever was reported on July 16, 1950, at Ocana, North Santander Department.

Plague Infection in Dallam County, Texas

A report, dated October 6, 1950, states that plague infection was proved positive for the following specimens obtained in Dallam County, Tex.: 64 fleas, *Opisocrostis hirsutus*, from prairie dog burrows collected by flagging September 26, 1950; and 168 fleas, *Opisocrostis hirsutus,* from 2 prairie dogs, *Cynomys ludovicianus,* shot September 26, 1950. These specimens were taken 2½ miles west of Perico. and are the first positive specimens obtained in Dallam County.

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The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, Public Health Service, Washington 25, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington 25, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request

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Public Health Reports

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FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

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Public Health Reports

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Hospital Beds in the United States, 1950

By John W. Cronin, M. D., Louis S. Reed, Ph. D., and Anna Mae Baney, A. B.*

At the beginning of 1950, according to the plans submitted by the States in order to qualify for Federal aid under the Hospital Survey and Construction program, the United States and Territories had a total of 1,118,535 hospital beds exclusive of those in hospitals owned by the Federal Government. Of these beds, 952,196 were appraised by the State agencies as "acceptable"; 166,339 were classified as "nonacceptable" because of fire and health hazards, obsolescence, unsuitable design, and similar factors. On the basis of the maximum allowances for Federal aid set forth in Title VI, Public Health Service Act, the States and Territories estimated that 897,856 additional beds, or 1,850,052 in all, would be needed to provide adequate hospital care to the Nation's population. Currently, therefore, the present supply of acceptable hospital beds meets only 51.5 percent of the Nation's estimated total bed need.

As prescribed by Title VI, Public Health Service Act, there are definite limits beyond which the Federal Government will not provide financial assistance for the construction of hospitals and health centers. These limits, used by each State in determining its total bed need in the individual hospital categories, are as follows: general, 4.5 to 5.5 beds per 1,000 population, depending on the State population density; mental, 5 beds per 1,000 population; tuberculosis, 2.5 beds per average annual death in the State from tuberculosis over the 5-year period, 1940–44 (averages for other 5-year periods may be used providing the average does not exceed that for the 1940–44 period); and chronic disease, 2 beds per 1,000 population. With respect to public health centers, the standard set forth in the act is one such health center per 30,000 population, except that in States having less than 12 persons per square mile the ratio is one per 20,000 population.

The State plans, which do not take account of beds in Federal hospitals, show that as of January 1, 1950, the United States and Territories have 437,786 acceptable beds for general hospital care; an additional 244,815 beds are estimated to be needed. There are 399,138 acceptable beds for the care of mental patients, exclusive of beds in institutions for the feeble-minded and epileptics since such institutions are considered as providing primarily domiciliary care; an additional 326,065 beds are estimated to be required. For tuberculosis hospital care, the States and Territories have 81,511 acceptable beds and need an additional 67,425. There are 33,761 beds reported as acceptable for the care of the chronically ill, and it is estimated that 259,551 additional beds are needed. The State plans show a total of 524 public health centers now in existence and 677 auxiliary facilities, such as laboratories, clinics and health department headquarters. Of the 4,369 additional public health centers estimated to be needed in terms of the maximum allowable for Federal aid, the States have programmed the construction of 1,570. An additional 1,433 auxiliary facilities have also been programmed. (See tables 3 to 8 for the above data for the individual States.)

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The above over-all figures are the results of a summary made as of January 1, 1950, of data presented in the then approved State plans for hospital construction. Revisions and amendments of plans are submitted from time to time by the State agencies. The majority of the plans, currently approved as of January 1, 1950, were prepared in 1949. A few plans were prepared in 1948 and a few at an earlier date.

Comparison of State Plan Statistics, 1950 and 1949

It is of interest to compare the situation regarding existing acceptable hospital beds and estimated additional beds needed, as shown by the State plans on January 1, 1950, with that for a year earlier, i. e., as summarized from the State plans on January 1, 1949 (*1*). During this interval, the State agencies of all but 11 States and the District of Columbia revised their plans for hospital construction. In virtually every case the revision took account of current construction and increased bed needs due to the growth in population.

As shown in table 1, the State plans showed a total of 1,025,179 beds in existence as of January 1, 1949, and 1,118,535 beds a year later—an increase of 93,356. This increase is partly due to the fact that the majority of the State plans as of January 1, 1950, had been revised and therefore included, as existing acceptable beds, most of the beds approved for construction under the program as well as the beds known to be under construction outside the program, i. e., without Federal aid.[1] The State plans as of January 1, 1949, however,

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[1] No separate data are available on the number of beds constructed outside the Federal-State hospital construction program. However, an estimate of the dollar volume of this construction is available from reports by the Department of Commerce and the Department of Labor. In 1949, the total value of "work put in place" on hospital and institutional construction amounted to $654,000,000. (It is estimated that

Table 1. *Number of existing beds and estimated net additional and total hospital beds needed, by type of bed, United States and Territories, as shown by State plans, as of Jan. 1, 1950, and Jan. 1, 1949 (hospital survey and construction program)*

Type of bed	Existing beds: Total	Existing beds: Acceptable	Existing beds: Non-acceptable [1]	Estimated net additional beds needed	Estimated total beds needed [2]	Percent of total need met by existing acceptable beds
Total	1,118,535	952,196	166,339	897,856	1,850,052	51.5
General	513,814	437,786	76,028	244,815	682,601	64.1
Mental	462,859	399,138	63,721	326,065	725,203	55.0
Tuberculosis	94,024	81,511	12,513	67,425	148,936	54.7
Chronic disease	47,838	33,761	14,077	259,551	293,312	11.5
JAN. 1, 1949						
Total	1,025,179	879,872	145,307	896,801	[3] 1,776,673	49.5
General	474,532	397,168	77,364	255,443	652,611	60.9
Mental	428,931	381,627	47,304	310,523	692,150	55.1
Tuberculosis	85,466	72,560	12,906	82,541	155,101	46.8
Chronic disease	36,250	28,517	7,733	248,294	276,811	10.3

[1] Represents beds classified as "nonacceptable" by the State agencies on the basis of fire and health hazards, obsolescence, unsuitable design, etc.

[2] Needs estimated by each State on the basis of the maximum ratios permissible for Federal aid as prescribed by Title VI, Public Health Service Act.

[3] The figures shown in the Jan. 1, 1949, report have been adjusted to represent the total existing acceptable beds in those States where existing beds exceeded the ratios prescribed by the act.

were for the most part the first plans submitted by the States and did not include any beds under construction. During this 1-year period, the number of existing acceptable beds increased from 879,872 to 952,106 or a net increase of 72,324 beds. More nonacceptable beds were also reported—166,339 as contrasted with 145,307 for the previous year. This increase is due primarily to the reporting of certain beds as nonacceptable which had been previously classified as "acceptable."

The total beds estimated to be needed as shown by the State plans on the two dates increased from 1,776,673 to 1,850,052. This difference is essentially due to the fact that in the revised State plans the total bed need was calculated on the basis of more recent population estimates. The net additional beds estimated to be needed, i. e., the difference between total beds needed and existing acceptable beds, increased only slightly, from 896,801 to 897,856. In short, despite the new construction, with or without Federal aid, the net additional beds needed by the population was about the same in 1950 as a year earlier.

The situation with regard to bed needs and available facilities varies among the different types of hospitals. Over the 1-year period, the

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institutional construction constitutes only a small percentage of the total.) Privately-financed construction amounted to $199,000,000 and public construction expenditures totaled $455,000,000. Of the total $654,000,000, the value of "work put in place" on projects constructed under the Hospital Survey and Construction program amounted to $113,000,000.

number of acceptable beds for general hospital care increased from 397,168 to 437,786—10.2 percent. Since this increase was greater than the increase in the population estimates used to determine total bed need, the estimated net additional beds needed decreased from 255,443 to 244,815. As a result, the percent of total needs met by existing acceptable beds rose from 60.9 to 64.1 percent.

Acceptable mental beds showed an increase of 17,511, while the increase in total beds needed amounted to 33,053 beds. Therefore, a smaller proportion of the total bed need was met on January 1, 1950, than in the previous year. In addition, the number of nonacceptable beds rose from 47,304 to 63,721.

The number of beds reported as acceptable for providing tuberculosis hospital care increased by 8,951 or about 12.3 percent. Since estimated total needs were revised downward by a considerable margin, the extent to which existing beds met total needs increased from 46.8 to 54.7 percent.

Within the chronic disease category, the State plans as of January 1, 1950, reported an additional 5,244 acceptable beds and 6,344 more nonacceptable beds than in the earlier year. The percent of need met by existing acceptable beds changed only slightly, i. e., from 10.3 to 11.5 percent.

Comparison of Statistics on Existing Beds as Shown by Annual Surveys

Since the American Hospital Association and the American Medical Association each make an annual canvass of the Nation's supply of hospital facilities and beds, it is interesting to compare their findings with those of the State plan hospital inventories. This comparison is shown in table 2.

The 1949 survey of the American Hospital Association found a total of 1,248,524 beds in non-Federal hospitals in the United States and 186,764 beds in Federally owned facilities. Most of these data, which appear in the latest directory of the Association (*2*), are reported by the hospitals as of September 30, 1949. The American Medical Association in its 1949 census, taken at the end of 1949 or the early months of 1950, reported 1,256,776 beds in non-Federal hospitals in the United States and 182,254 beds in Federal hospitals (*3*). As of January 1, 1950, the State plans, the majority of which were prepared in either 1949 or 1948, show that for the United States (exclusive of Territories) there was a total of 1,099,493 beds in non-Federal hospitals.

The over-all differences in bed count among the surveys are largely accounted for by the following factors: (1) the American Hospital Association and American Medical Association surveys include insti-

Table 2. *Comparison of number of existing beds in non-Federal hospitals, continental United States, as shown by the annual surveys of the American Hospital Association and American Medical Association and by the State plans submitted under the Hospital Survey and Construction program*

Service classification	American Hospital Association 1949[1]	American Medical Association, 1949[2]	State plans Jan. 1, 1950
Total	1,248,524	1,256,776	1,099,493
Total, exclusive of (a) institutions for feeble-minded and epileptics and (b) hospital departments of institutions	1,112,266	1,116,147	1,099,493
General and special (including chronic)	[3] 555,729	[3] 542,268	[4] 550,413
Hospital departments of institutions	[5] 18,895	18,261	
All others	536,834	524,007	550,413
Mental	[3] 614,465	[3] 641,251	[4] 459,516
Institutions for feeble-minded and epileptics	[5] 117,363	[6] 122,368	
All others	497,102	518,883	459,516
Tuberculosis	[3] 78,330	[3] 73,257	[4] 89,564

[1] Most of these data are reported as of Sept. 30, 1949. Source: Statistics and Directory Section. Hospitals. vol. 24, No. 6 (June 1950), pt. 2.

[2] Data relate to the end of 1949 or the early months of 1950. Source: Hospital Service in the United States by F. H. Arestad, M. D. and Mary A. McGovern. Journal of the American Medical Association, vol. 143, No. 1 (May 6, 1950).

[3] Includes some beds in other service categories since the American Hospital Association and the American Medical Association classify all beds in a facility according to the predominant type of service provided.

[4] The revised State plans report as existing acceptable beds most of the beds approved for construction under the Federal-State hospital program as well as those currently under construction without Federal aid.

[5] Not directly available from American Hospital Association data, but estimated on the assumption that beds in these facilities represent the same proportion of total beds reported by the American Hospital Association as those enumerated by the American Medical Association.

[6] Obtained from a count of all such institutions listed by the American Medical Association.

tutions for the feeble-minded and epileptics and hospital departments of institutions, both of which are excluded from the State plans; (2) the State plans include among the existing acceptable beds those beds which are being constructed or are to be constructed through approved project applications under the Hospital Survey and Construction program; (3) the American Hospital Association and American Medical Association surveys report beds actually set up to provide in-patient care, while the State plans report the normal bed capacity, i. e., the number of beds for which the hospital was designed; (4) variations in bed capacity resulting from differences in reporting dates for the three surveys; and (5) the inclusion of individual hospitals in one inventory for which reports were not submitted to one or both of the other inventories.

Another factor which must be considered in comparing these data is the fact that, in the State plans, when at least 10 hospital beds are assigned for the care of patients in categories other than the medical service classification of the hospital, the beds are reported according to the specific service for which the bed is used. For example, a unit of 10 or more mental beds in a general hospital is included in the tabulation of mental beds. Therefore, beds reported for a single hospital may fall into several classifications such as general, mental, and chronic. The American Medical Association and the American Hospital Association, on the other hand, classify all beds in a hospital according to the predominant type of care provided, e. g., all beds in

Table 3. *All hospital beds. Number of existing beds and estimated net additional and total beds needed, as shown by State plans as of Jan. 1, 1950 (hospital survey and construction program)*

State	Population[1]		Existing beds			Estimated net additional beds needed	Estimated total beds needed[3]
	Year	Total	Total	Acceptable	Nonacceptable[2]		
United States and Territories	-----	146,618,837	1,118,535	952,196	166,339	897,856	1,850,052
United States	-----	143,809,264	1,099,493	936,895	162,598	867,833	1,804,728
Alabama	1948	2,839,000	13,441	10,327	3,114	25,801	36,128
Arizona	1948	654,000	5,193	4,733	460	5,044	9,777
Arkansas	1946	1,877,409	10,592	6,847	3,745	17,109	23,956
California	1948	9,894,000	73,658	64,601	9,057	51,996	116,597
Colorado	1945	1,060,239	11,429	10,367	1,062	4,309	14,676
Connecticut	1948	2,011,000	16,880	16,718	162	8,205	24,923
Delaware	1948	297,000	2,796	2,334	462	1,447	3,781
District of Columbia	1946	815,195	10,765	5,900	4,865	4,965	10,865
Florida	1947	2,346,000	16,095	14,695	1,400	14,595	29,290
Georgia	1948	3,128,000	21,211	20,047	1,164	18,744	38,791
Idaho	1948	586,000	3,281	2,743	538	4,457	7,200
Illinois	1947	8,221,000	62,313	49,276	13,037	52,807	102,083
Indiana	1947	3,835,000	20,727	17,652	3,075	29,338	46,990
Iowa	1946	2,539,075	21,648	12,528	9,120	17,816	30,344
Kansas	1946	1,873,614	12,322	11,716	606	11,374	23,090
Kentucky	1946	2,745,590	16,729	15,965	764	19,756	35,721
Louisiana	1948	2,566,000	20,019	16,052	3,967	17,108	33,160
Maine	1946	874,038	7,587	6,208	1,379	4,580	10,788
Maryland	1948	2,118,000	18,645	16,188	2,457	11,218	27,406
Massachusetts	1947	4,634,500	44,603	39,585	5,018	19,813	59,398
Michigan	1947	6,069,000	43,660	30,749	12,911	43,900	74,649
Minnesota	1947	2,888,000	23,356	20,075	3,281	16,390	36,465
Mississippi	1948	2,112,000	12,071	9,644	2,427	17,228	26,872
Missouri	1946	3,776,250	29,090	28,113	977	20,682	48,795
Montana	1947	492,240	4,928	4,351	577	2,527	6,878
Nebraska	1946	1,275,713	11,867	10,496	1,371	5,448	15,944
Nevada	1948	141,000	1,145	1,108	37	916	2,024
New Hampshire	1946	513,448	4,576	4,300	276	1,975	6,275
New Jersey	1947	4,627,000	36,525	34,547	1,978	22,971	57,518
New Mexico	1948	571,000	3,275	3,152	123	5,002	8,154
New York	[4] 1949	14,749,128	153,272	125,180	28,092	59,521	184,701
North Carolina	1948	3,675,000	24,759	23,054	1,705	24,500	47,554
North Dakota	1947	541,000	5,383	5,316	67	2,504	7,820
Ohio	1947	7,667,600	50,249	45,279	4,970	50,109	95,388
Oklahoma	1947	2,275,004	15,380	14,918	462	14,593	29,511
Oregon	1948	1,625,000	9,206	8,607	599	10,828	19,435
Pennsylvania	1948	10,676,000	81,010	68,479	12,531	63,677	132,156
Rhode Island	1948	739,000	7,374	6,528	846	2,684	9,212
South Carolina	1948	1,960,000	10,693	9,783	910	14,639	24,422
South Dakota	1943	544,866	4,860	4,382	478	3,047	7,429
Tennessee	1948	3,140,000	19,436	19,300	136	21,535	40,835
Texas	1948	7,153,000	43,646	42,798	848	48,986	91,784
Utah	1947	638,000	3,722	3,475	247	4,346	7,821
Vermont	1947	364,000	3,272	2,333	939	2,153	4,486
Virginia	1948	2,975,000	20,369	15,068	5,301	22,430	37,498
Washington	1948	2,453,000	20,223	17,565	2,658	13,100	30,665
West Virginia	1943	1,732,355	10,902	7,893	3,009	14,100	21,993
Wisconsin	1947	3,246,000	33,434	24,232	9,202	15,703	39,935
Wyoming	1947	275,000	1,876	1,688	188	1,857	3,545
Territories	------	2,809,573	19,042	15,301	3,741	30,023	45,324
Alaska	[4] 1949	94,875	630	296	334	1,886	2,182
Hawaii	[4] 1940	536,540	4,955	3,196	1,759	4,111	7,307
Puerto Rico	1947	2,149,000	13,107	11,809	1,298	23,658	35,467
Virgin Islands	([4])	29,158	350	---------	350	368	368

[1] Bureau of the Census population estimates for July 1 of the year indicated as reported in the State plans for hospital construction.

[2] Represents beds classified as "nonacceptable" by the State agencies on the basis of fire and health hazards, obsolescence, unsuitable design, etc.

[3] Needs estimated by each State on the basis of the maximum ratios permissible for Federal aid as prescribed by Title VI, Public Health Service Act.

[4] Population as estimated by the State agency.

Table 4. *General hospital beds.*[1] *Number of existing beds and estimated net additional and total beds needed, as shown by State plans as of Jan. 1, 1950 (hospital survey and construction program)*

State	Existing beds				Estimated net additional beds needed	Estimated total beds needed[4]
	Total	Acceptable		Nonacceptable[3]		
		Number	Per 1,000 population[2]			
United States and Territories	513,814	437,786	3.0	76,028	244,815	682,601
United States	503,067	430,367	3.0	72,700	239,492	669,859
Alabama	7,377	5,980	2.1	1,397	6,817	12,797
Arizona	2,993	2,626	4.0	367	1,021	3,647
Arkansas	4,445	3,290	1.8	1,155	5,194	8,484
California	33,100	29,388	3.0	3,712	16,392	45,780
Colorado	4,860	4,082	3.9	778	1,470	5,552
Connecticut	6,637	6,475	3.2	162	2,650	9,125
Delaware	1,213	1,201	4.0	12	219	1,420
District of Columbia	4,112	2,111	2.6	2,001	1,557	3,668
Florida	7,907	7,295	3.1	612	3,393	10,688
Georgia	9,103	7,939	2.5	1,164	6,136	14,075
Idaho	2,097	1,559	2.7	538	1,371	2,930
Illinois	29,892	24,983	3.0	4,909	12,342	37,325
Indiana	9,901	7,482	2.0	2,419	9,843	17,325
Iowa	9,511	7,198	2.8	2,313	4,393	11,591
Kansas	7,388	6,782	3.6	606	2,180	8,962
Kentucky	7,394	6,976	2.5	418	5,511	12,487
Louisiana	10,040	8,708	3.4	1,332	3,215	11,923
Maine	3,035	1,656	1.9	1,379	2,277	3,933
Maryland	7,048	6,835	3.2	213	2,710	9,545
Massachusetts	17,996	13,006	2.8	4,990	9,977	22,983
Michigan	19,274	14,652	2.4	4,622	13,238	27,890
Minnesota	12,348	9,758	3.4	2,590	4,561	14,319
Mississippi	6,699	5,154	2.4	1,545	4,501	9,655
Missouri	14,319	13,342	3.5	977	4,934	18,276
Montana	2,893	2,316	4.7	577	727	3,043
Nebraska	5,457	4,086	3.2	1,371	2,426	6,512
Nevada	834	797	5.7	37	67	864
New Hampshire	2,204	1,928	3.8	276	446	2,374
New Jersey	15,995	14,543	3.1	1,452	6,914	21,457
New Mexico	1,794	1,671	2.9	123	1,549	3,220
New York	60,973	48,259	3.3	12,714	18,735	66,994
North Carolina	11,900	11,056	3.0	844	7,283	18,339
North Dakota	2,837	2,770	5.1	67	988	3,758
Ohio	24,782	23,120	3.0	1,662	11,492	34,612
Oklahoma	7,772	7,310	3.2	462	3,785	11,095
Oregon	4,623	4,106	2.5	517	3,261	7,367
Pennsylvania	38,164	33,084	3.1	5,080	15,620	48,704
Rhode Island	2,162	1,746	2.4	416	1,580	3,326
South Carolina	5,900	5,321	2.7	579	3,811	9,132
South Dakota	2,780	2,302	4.2	478	860	3,162
Tennessee	8,088	7,952	2.5	136	6,306	14,258
Texas	24,062	23,235	3.2	827	9,778	33,013
Utah	2,404	2,189	3.4	215	1,001	3,190
Vermont	1,350	1,021	2.8	329	617	1,638
Virginia	8,343	7,579	2.5	764	5,969	13,548
Washington	8,560	7,942	3.2	618	3,248	11,190
West Virginia	6,329	4,671	2.7	1,658	3,308	7,979
Wisconsin	13,084	11,985	3.7	1,099	3,209	15,194
Wyoming	1,088	900	3.3	188	610	1,510
Territories	10,747	7,419	2.6	3,328	5,323	12,742
Alaska	461	127	1.3	334	397	524
Hawaii	2,480	950	1.8	1,530	1,464	2,414
Puerto Rico	7,509	6,342	3.0	1,167	3,326	9,668
Virgin Islands	297	------------	------------	297	136	136

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[1] Includes beds in hospitals planned for the care and treatment of acute conditions and specialized types of cases other than mental, tuberculosis and chronic disease.

[2] Calculated on the basis of the State population reported in the State plans as shown in table 3.

[3] Represents beds classified as "nonacceptable" by the State agencies on the basis of fire and health hazards, obsolescence, unsuitable design, etc.

[4] Needs estimated by each State on the basis of the maximum ratios permissible for Federal aid as prescribed by Title VI, Public Health Service Act, namely 4.5-5.5 beds per 1,000 population, depending on the State population density.

Table 5. *Mental hospital beds.*[1] *Number of existing beds and estimated net additional and total beds needed, as shown by State plans as of Jan. 1, 1950 (hospital survey and construction program)*

State	Existing beds				Estimated net additional beds needed	Estimated total beds needed [4]
	Total	Acceptable		Non-acceptable [3]		
		Number	Per 1,000 population [2]			
United States and Territories	462,859	399,138	2.7	63,721	326,065	725,203
United States	459,516	395,846	2.8	63,670	315,321	711,167
Alabama	5,340	3,828	1.3	1,512	10,367	14,195
Arizona	1,510	1,510	2.3	----------	1,760	3,270
Arkansas	4,796	2,206	1.2	2,590	7,181	9,387
California	29,408	28,310	2.9	1,098	13,386	41,696
Colorado	5,268	5,204	4.9	64	96	5,300
Connecticut	8,057	8,057	4.0	----------	1,998	10,055
Delaware	1,154	704	2.4	450	781	1,485
District of Columbia	5,161	2,567	3.1	2,594	1,509	4,076
Florida	5,882	5,836	2.5	46	5,894	11,730
Georgia	9,327	9,327	3.0	----------	6,313	15,640
Idaho	921	921	1.6	----------	2,009	2,930
Illinois	23,979	16,102	2.0	7,877	25,003	41,105
Indiana	8,756	8,634	2.3	122	10,541	19,175
Iowa	7,114	4,305	1.7	2,809	8,390	12,695
Kansas	4,486	4,486	2.4	----------	4,884	9,370
Kentucky	7,383	7,286	2.7	97	6,442	13,728
Louisiana	8,288	5,805	2.3	2,483	7,025	12,830
Maine	3,856	3,856	4.4	----------	514	4,370
Maryland	6,101	5,908	2.8	193	4,682	10,590
Massachusetts	21,123	21,102	4.6	21	2,070	23,172
Michigan	18,489	11,351	1.9	7,138	18,994	30,345
Minnesota	8,246	7,789	2.7	457	6,651	14,440
Mississippi	4,696	3,879	1.8	817	6,681	10,560
Missouri	11,885	11,885	3.1	----------	6,995	18,880
Montana	1,800	1,800	3.7	----------	584	2,384
Nebraska	6,210	6,210	4.9	----------	168	6,378
Nevada	290	290	2.1	----------	415	705
New Hampshire	1,985	1,985	3.9	----------	580	2,565
New Jersey	14,441	14,307	3.1	134	8,828	23,135
New Mexico	1,085	1,085	1.9	----------	1,770	2,855
New York	74,108	61,599	4.2	12,509	12,147	73,746
North Carolina	10,610	9,933	2.7	677	8,442	18,375
North Dakota	2,160	2,160	4.0	----------	545	2,705
Ohio	21,033	18,827	2.5	2,206	19,511	38,338
Oklahoma	6,059	6,059	2.7	----------	5,316	11,375
Oregon	4,006	4,006	2.5	----------	4,119	8,125
Pennsylvania	35,749	30,313	2.8	5,436	23,067	53,380
Rhode Island	3,418	2,988	4.0	430	707	3,695
South Carolina	3,631	3,496	1.8	135	6,304	9,800
South Dakota	1,888	1,888	3.5	----------	836	2,724
Tennessee	7,432	7,432	2.4	----------	8,321	15,753
Texas	14,004	14,004	2.0	----------	21,761	35,765
Utah	1,120	1,120	1.8	----------	2,070	3,190
Vermont	1,810	1,200	3.3	610	620	1,820
Virginia	10,134	5,888	2.0	4,246	8,987	14,875
Washington	6,545	6,065	2.5	480	6,200	12,265
West Virginia	3,252	2,201	1.3	1,051	6,384	8,585
Wisconsin	14,814	9,426	2.9	5,388	6,804	16,230
Wyoming	706	706	2.6	----------	669	1,375
Territories	3,343	3,292	1.2	51	10,744	14,036
Alaska	----------	----------	----------	----------	474	474
Hawaii	934	934	1.7	----------	1,749	2,683
Puerto Rico	2,378	2,358	1.1	20	8,337	10,745
Virgin Islands	31	----------	----------	31	134	134

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[1] Includes beds in hospitals for the diagnosis and treatment of nervous and mental illness but excludes beds in institutions for the feeble-minded and epileptics.

[2] Calculated on the basis of the State population reported in the State plans as shown in table 3.

[3] Represents beds classified as "nonacceptable" by the State agencies on the basis of fire and health hazards, obsolescence, unsuitable design, etc.

[4] Needs estimated by each State on the basis of the maximum ratios permissible for Federal aid as prescribed by Title VI, Public Health Service Act, namely 5 beds per 1,000 population.

Table 6. *Tuberculosis hospital beds.*[1] *Number of existing beds and estimated net additional and total beds needed, as shown by State plans, as of Jan. 1, 1950 (hospital survey and construction program)*

State	Average annual T. B. deaths[2]		Existing beds				Estimated net additional beds needed	Estimated total beds needed[2]
				Acceptable				
	Years	Number of deaths	Total	Number	Per T. B. death	Nonacceptable[3]		
United States and Territories	--------	58,754.4	94,024	81,511	1.39	12,513	67,425	[5] 148,936
United States	--------	53,778.8	89,564	77,188	1.43	12,376	58,815	[5] 136,003
Alabama	1940-44	1,383.0	724	519	.38	205	2,939	3,458
Arizona	1940-44	621.0	526	526	.85	--------	1,026	1,552
Arkansas	1940-44	932.0	1,351	1,351	1.45	--------	979	2,330
California	1943-47	3,733.0	7,752	5,353	1.43	2,399	3,980	9,333
Colorado	1940-44	399.0	1,270	1,050	2.63	220	654	[4] 1,704
Connecticut	1940-44	597.0	1,721	1,721	2.88	--------	--------	[5] 1,721
Delaware	1945-47	113.0	193	193	1.71	--------	89	282
District of Columbia	1940-44	596.0	1,177	1,052	1.77	125	439	1,491
Florida	1940-44	872.0	1,540	893	1.02	647	1,287	2,180
Georgia	1943-47	1,128.0	1,460	1,460	1.29	--------	1,360	2,820
Idaho	1944-48	67.0	70	70	1.04	--------	38	108
Illinois	1942-46	2,884.4	5,044	5,044	1.75	--------	2,167	7,211
Indiana	1943-47	1,128.0	1,771	1,237	1.10	534	1,583	2,820
Iowa	1940-44	392.0	777	639	1.63	128	341	980
Kansas	1940-44	404.0	448	448	1.11	--------	562	1,010
Kentucky	1943-47	1,606.0	1,640	1,614	1.00	26	2,401	4,015
Louisiana	1940-44	1,310.0	1,465	1,313	1.00	152	1,962	3,275
Maine	1940-44	295.0	526	526	1.78	--------	211	737
Maryland	1943-47	1,214.0	1,969	1,829	1.51	140	1,206	3,035
Massachusetts	1940-44	1,590.0	3,695	3,688	2.32	7	287	3,975
Michigan	1944-48	1,710.4	4,676	3,659	2.14	1,017	617	4,276
Minnesota	1943-47	652.0	1,995	1,930	2.96	65	--------	[5] 1,930
Mississippi	1940-44	973.0	676	611	.63	65	1,822	2,433
Missouri	1940-44	1,635.0	1,805	1,805	1.10	--------	2,282	4,087
Montana	1940-44	199.0	235	235	1.18	--------	262	497
Nebraska	1940-44	201.0	200	200	1.00	--------	303	502
Nevada	1940-44	69.0	21	21	.30	--------	152	173
New Hampshire	1940-44	124.0	189	189	1.53	--------	121	310
New Jersey	1943-48	1,736.0	3,290	3,211	1.85	79	461	3,672
New Mexico	1940-44	374.8	353	353	.94	--------	584	937
New York	1943-47	5,785.0	12,256	9,510	1.65	2,716	4,923	14,463
North Carolina	1940-44	1,396.0	2,014	1,830	1.31	184	1,660	3,490
North Dakota	1943-47	98.0	275	275	2.81	--------	--------	[5] 275
Ohio	1940-44	2,841.0	3,825	3,332	1.17	493	3,771	7,103
Oklahoma	1940-44	996.4	1,264	1,264	1.27	--------	1,227	2,491
Oregon	1943-47	277.2	577	495	1.79	82	198	693
Pennsylvania	1943-47	3,488.0	5,671	3,772	1.08	1,899	4,948	8,720
Rhode Island	1940-44	285.0	622	622	2.18	--------	91	713
South Carolina	1943-47	628.0	990	794	1.26	196	776	1,570
South Dakota	1940-44	181.0	192	192	1.06	--------	261	453
Tennessee	1940-44	1,759.8	1,862	1,862	1.06	--------	2,538	4,400
Texas	1940-44	3,480.0	3,434	3,413	.98	21	5,287	8,700
Utah	1940-44	66.0	96	96	1.45	--------	69	165
Vermont	1940-44	120.0	112	112	.93	--------	188	300
Virginia	1944-48	1,250.0	1,892	1,601	1.28	291	1,524	3,125
Washington	1940-44	586.4	2,394	2,126	3.63	268	177	[6] 2,303
West Virginia	1940-44	797.8	1,321	1,021	1.28	300	974	1,995
Wisconsin	1940-44	760.6	2,126	2,019	2.65	107	--------	[5] 2,019
Wyoming	1940-44	44.0	82	82	1.86	--------	28	110
Territories	--------	4,975.6	4,460	4,323	.87	137	8,610	12,933
Alaska	1944-48	398.0	169	169	.42	--------	826	995
Hawaii	1944-48	257.4	1,252	1,137	4.42	115	--------	[5] 1,137
Puerto Rico	1943-47	4,302.2	3,017	3,017	.70	--------	7,739	10,756
Virgin Islands	1940-44	18.0	22	--------	--------	22	45	45

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[1] Includes beds for diagnosis and treatment, excluding preventoria.

[2] Most of the States estimated their total bed needs on the basis of the maximum ratios permissible for Federal aid as prescribed by Title VI, Public Health Service Act, namely 2.5 times the average annual deaths from tuberculosis in the State over the 5-year period, 1940-44. Regulations permit the use of averages for other 5-year periods not exceeding that for the 1940-44 period.

[3] Beds classified as "nonacceptable" by the State agencies on the basis of fire and health hazards, etc.

[4] Colorado has more than 2.5 beds per average annual death. Since two-thirds of its beds are for out-of-State residents, additional beds are required for the tuberculous in that State.

[5] In these States, the total beds needed, based on the prescribed ratio, are less than the total number of acceptable beds. However, the total number of acceptable beds has been used as the total needed since it is assumed that the States need all acceptable tuberculosis beds.

[6] On the basis of the prescribed ratio the State of Washington needs 1,466 beds; however, the State has determined that the bed need is greater than the ratio allowable.

Table 7. *Chronic disease hospital beds.*[1] *Number of existing beds and estimated net additional and total beds needed, as shown by State plans as of Jan. 1, 1950 (hospital survey and construction program)*

State	Existing beds				Estimated net additional beds needed	Estimated total beds needed [4]
	Total	Acceptable		Nonacceptable [3]		
		Number	Per 1,000 population [2]			
United States and Territories	47,838	33,761	0.23	14,077	259,551	293,312
United States	47,346	33,494	.23	13,852	254,205	287,699
Alabama	------	------	------	------	5,678	5,678
Arizona	164	71	.11	93	1,237	1,308
Arkansas	------	------	------	------	3,755	3,755
California	3,398	1,550	.16	1,848	18,238	19,788
Colorado	31	31	.03	------	2,089	2,120
Connecticut	465	465	.23	------	3,557	4,022
Delaware	236	236	.79	------	358	594
District of Columbia	315	170	.21	145	1,460	1,630
Florida	766	671	.29	95	4,021	4,692
Georgia	1,321	1,321	.42	------	4,935	6,256
Idaho	193	193	.33	------	979	1,172
Illinois	3,398	3,147	.38	251	13,295	16,442
Indiana	299	299	.08	------	7,371	7,670
Iowa	4,246	386	.15	3,860	4,692	5,078
Kansas	------	------	------	------	3,748	3,748
Kentucky	312	89	.03	223	5,402	5,491
Louisiana	226	226	.09	------	4,906	5,132
Maine	170	170	.19	------	1,578	1,748
Maryland	3,527	1,616	.76	1,911	2,620	4,236
Massachusetts	1,789	1,789	.39	------	7,479	9,268
Michigan	1,221	1,087	.18	134	11,051	12,138
Minnesota	767	598	.21	169	5,178	5,776
Mississippi	------	------	------	------	4,224	4,224
Missouri	1,081	1,081	.29	------	6,471	7,552
Montana	------	------	------	------	954	954
Nebraska	------	------	------	------	2,551	2,551
Nevada	------	------	------	------	282	282
New Hampshire	198	198	.39	------	828	1,026
New Jersey	2,799	2,486	.54	313	6,768	9,254
New Mexico	43	43	.08	------	1,099	1,142
New York	5,935	5,782	.39	153	23,716	29,498
North Carolina	235	235	.06	------	7,115	7,350
North Dakota	111	111	.21	------	971	1,082
Ohio	609	------	------	609	15,335	15,335
Oklahoma	285	285	.13	------	4,265	4,550
Oregon	------	------	------	------	3,250	3,250
Pennsylvania	1,426	1,310	.12	116	20,042	21,352
Rhode Island	1,172	1,172	1.59	------	306	1,478
South Carolina	172	172	.09	------	3,748	3,920
South Dakota	------	------	------	------	1,090	1,090
Tennessee	2,054	2,054	.65	------	4,370	6,424
Texas	2,146	2,146	.30	------	12,160	14,306
Utah	102	70	.11	32	1,206	1,276
Vermont	------	------	------	------	728	728
Virginia	------	------	------	------	5,950	5,950
Washington	2,724	1,432	.58	1,292	3,475	4,907
West Virginia	------	------	------	------	3,434	3,434
Wisconsin	3,410	802	.25	2,608	5,690	6,492
Wyoming	------	------	------	------	550	550
Territories	492	267	.10	225	5,346	5,613
Alaska	------	------	------	------	189	189
Hawaii	289	175	.33	114	898	1,073
Puerto Rico	203	92	.04	111	4,206	4,298
Virgin Islands	------	------	------	------	53	53

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[1] Includes beds in hospitals, the primary purpose of which is medical treatment of chronic illness, including the degenerative diseases, and which furnish hospital treatment and care; excludes tuberculosis and mental hospitals, nursing homes, and institutions, the primary purpose of which is domiciliary care.

[2] Calculated on the basis of the State population reported in the State plans as shown in table 3.

[3] Represents beds classified as "nonacceptable" by the State agencies on the basis of fire and health hazards, obsolescence, unsuitable design, etc.

[4] Needs estimated by each State on the basis of the maximum ratios permissible for Federal aid as prescribed by Title VI, Public Health Service Act, namely 2 beds per 1,000 population.

a general hospital are counted as general beds even though a definite number of beds are assigned for care of mental patients.

As is shown in table 2, if the beds in institutions for the feeble-minded and epileptics and hospital departments of institutions are excluded from the bed count, a total of 1,112,266 non-Federal beds is obtained from the American Hospital Association survey[2] and 1,116,147 from the American Medical Association. The State plans report a total of 1,099,493 beds.

In the general and special hospital category, the American Hospital Association reported 555,729 beds and the American Medical Association 542,268; the State plan reports showed a total of 550,413. The American Hospital Association and American Medical Association, it will be recalled, included beds in hospital departments of institutions which are excluded from the State plan data. If beds in these institutions are deducted (a total of 18,261 as reported by the American Medical Association and 18,895 as estimated for the American Hospital Association) the State plan total for the general and special hospital category exceeds the American Hospital Association and American Medical Association estimates by 13,579 and 26,406 beds, respectively. Most of this difference is presumably due to the fact that in the revised State plans, beds programmed for construction and beds currently being constructed are counted as existing acceptable beds.

With respect to beds for the care of the mentally ill, the American Medical Association reported 518,883 beds exclusive of beds in institutions for the feeble-minded and epileptics; it is estimated that 497,102 such beds are reported in the American Hospital Association survey. The State plans show 37,586 less beds than the American Hospital Association inventory and 59,367 less than the American Medical Association. In seeking an explanation for these differences, the prevalence of over-crowding in many mental facilities must be considered. Throughout the country, occupancy rates in 1949 reached an average of 97 percent in mental disease hospitals. This indicates that many more beds are in use than the number for which most mental facilities were originally designed. The State plans, as stated previously, report only the beds for which hospitals were designed rather than those actually in use, as reported by the American Hospital Association and the American Medical Association.

The State plans, however, report 11,234 more tuberculosis beds than the American Hospital Association and 16,307 more than the American Medical Association. In addition to beds under construction being listed in the State plans as existing acceptable beds, this

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[2] Since the American Hospital Association hospital classification code does not indicate those facilities which are institutions for the feeble-minded and epileptics or departments of institutions, it is assumed that beds in these non-Federal facilities represent the same proportion of total beds reported by the American Hospital Association as those enumerated by the American Medical Association.

Table 8. ***Public health centers.*** *Number of existing, programmed, and needed public health centers* [1] *and auxiliary facilities,* [2] *as shown by State plans as of Jan. 1, 1950 (hospital survey and construction program)*

State	Public health centers				Auxiliary facilities		
	Total	Existing acceptable	Programmed	Total needed [3]	Total	Existing acceptable	Programmed
United States and Territories	2,094	524	1,570	4,893	2,110	677	1,433
United States	1,991	477	1,514	4,798	2,063	652	1,411
Alabama	67	34	33	95	27	7	20
Arizona	7	3	4	32	13	1	12
Arkansas	77	5	72	62	---	---	---
California	80	16	64	330	152	23	129
Colorado	16	2	14	53	32	---	32
Connecticut	60	30	30	67	---	---	---
Delaware	5	---	5	10	---	---	---
District of Columbia	6	1	5	27	---	---	---
Florida	39	3	36	75	164	16	148
Georgia	57	14	43	104	128	25	103
Idaho	6	2	4	29	17	3	14
Illinois	66	1	65	274	---	---	---
Indiana	38	1	37	127	---	---	---
Iowa	27	1	26	85	---	---	---
Kansas	49	16	33	63	---	---	---
Kentucky	22	8	14	91	98	12	86
Louisiana	52	16	36	85	55	5	50
Maine	25	---	25	29	---	---	---
Maryland	33	20	13	71	113	113	---
Massachusetts	41	11	30	152	2	1	1
Michigan	66	35	31	202	16	16	---
Minnesota	11	3	8	96	2	---	2
Mississippi	70	38	32	70	174	19	155
Missouri	43	11	32	125	---	---	---
Montana	13	1	12	28	1	---	1
Nebraska	23	2	21	42	6	4	2
Nevada	3	2	1	7	---	---	---
New Hampshire	---	---	---	---	---	---	---
New Jersey	42	---	42	139	---	---	---
New Mexico	10	9	1	29	32	13	19
New York	188	30	158	462	288	288	---
North Carolina	101	12	89	123	14	---	14
North Dakota	8	2	6	27	---	---	---
Ohio	39	9	30	256	61	6	55
Oklahoma	75	9	66	75	18	2	16
Oregon	18	12	6	54	4	2	2
Pennsylvania	46	22	24	355	---	---	---
Rhode Island	7	7	---	24	---	---	---
South Carolina	46	22	24	64	237	38	199
South Dakota	11	---	11	27	---	---	---
Tennessee	99	18	81	99	97	33	64
Texas	91	16	75	238	133	10	123
Utah	16	3	13	32	2	1	1
Vermont	5	---	5	12	13	---	13
Virginia	94	17	77	99	---	---	---
Washington	20	8	12	73	54	13	41
West Virginia	22	3	19	57	60	---	60
Wisconsin	45	1	44	108	46	1	45
Wyoming	6	1	5	14	4	---	4
Territories	103	47	56	95	47	25	22
Alaska	19	15	4	5	3	3	---
Hawaii	11	2	9	17	37	19	18
Puerto Rico	72	30	42	72	3	3	---
Virgin Islands	1	---	1	1	4	---	4

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[1] Represents publicly owned facilities utilized by a local health unit for the provision of public health services.

[2] Represents publicly owned auxiliary facilities such as laboratories or clinics physically separated from the administrative offices of the local health unit.

[3] Needs estimated by each State on the basis of the maximum ratios permissible for Federal aid as prescribed by Title VI, Public Health Service Act, namely, one public health center per 30,000 population in States having less than 12 persons per square mile and one per 20,000 population in States having 12 or more persons per square mile.

excess is due to the fact that many tuberculosis beds are in general hospitals and are therefore tabulated as general beds by the American Hospital Association and the American Medical Association.

Summary

The State plans, submitted under the Hospital Survey and Construction program, constitute a unique statement of the Nation's supply of hospital beds, since they include a classification of beds according to acceptability or nonacceptability and type of service for which the bed is utilized. The data presented show for the Nation as a whole and for the individual States the present supply of hospital beds and the additional beds estimated to be needed to provide adequate hospital care to the entire population.

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The Alkalescens-Dispar Group

By W. H. Ewing, M. W. Taylor, and M. C. Hucks*

Recently, Kauffmann (*26*) proposed a classification of the family Enterobacteriaceae in which the microorganisms known as *Shigella alkalescens* and *Shigella dispar* were removed from the genus *Shigella* and included in a special group termed the Alkalescens-Dispar group. The new group was placed in the tribe Eschericheae. Kauffmann's decision to make these changes was logical, and it was based upon the results of his investigations (cited below) on the relationships of *S. alkalescens* and *S. dispar* cultures to certain of the established O groups of *Escherichia coli* (*15*, *23*, *26*, *27*, *32*) and upon the biochemical behavior of *S. alkalescens* and *S. dispar* cultures. The work of other investigators on the relationships of these and other microorganisms to members of the genus *Escherichia* affords ancillary evidence for Kauffmann's conclusions (for example, see *16*, *31*).

Frantzen (*18*), utilizing the methods recommended by Kauffmann (*23*, *24*, *25*), proposed an antigenic schema (table 1) for the Alkalescens-Dispar (A-D) group based upon an extensive study of the relationships of its members to each other and to *E. coli* O groups. Kauffmann (*26*) reported that certain types now included in the A-D group contain K antigens. Frantzen confirmed this fact and reported the presence of K antigens of the L and A types in certain A-D cultures. A detailed study of the K antigens of cultures of the A-D group is in progress (*19*).

The results of agglutination tests which reveal the O antigen relationships of members of the A-D group to each other and to known *E. coli* O groups are given in tables 2, 3, and 4. The results of reciprocal absorption tests with O antiserums prepared with members of the A-D and *E. coli* groups confirm the relationships between these groups that are described by Kauffmann and by Frantzen. The results of our tests indicate that A-D 08 and *E. coli* 081 are O-identical.

The Alkalescens-Dispar schema affords a practical means for the identification and reporting of its members. Since the members of the A-D group are related closely to, or are identical with, certain *E. coli* O groups, it would be feasible to classify these microorganisms as anaerogenic *E. coli* cultures of the several O groups. We are in accord with Kauffmann's view that such a change is not advisable at this time. However, if new types are found, they may be described as anaerogenic *Escherichia* cultures related to, or identical with, cer-

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Table 1. *The O antigenic schema for the Alkalescens-Dispar group* [1]

O groups	O antigen	Relationship to *Escherichia coli* O groups	Earlier designations
1	 1a 1a, 1b	Identical with: 1a 1a, 1b	*B. Alkalescens* or *Alkalescens* type I.
2	2	Strong relationship with 25 and other groups.	*Alkalescens* type II or *S. tieté.*
3	3	Strong relationship with 25 and other groups.	*S. ceylonensis* B or *S. dispar* type II or *Alkalescens* type III (2-193).
4	4	Strong relationship with 4	*S. madampensis* or, *S. dispar* I.
5	5	Identical with 2a	None.
6	6	Identical with 9	*S. dispar* type III.
7	7	Identical with 7	None.
8	8	Identical with 81	None.

[1] From Frantzen (*18*), modified.

tain *E. coli* O groups. These views were adopted by Ewing and Kauffmann (*17*) in their discussion of the microorganism named *Shigella guanabara* by de Assis (*14*). This type was identified as an anaerogenic member of *E. coli* 0112.

This report reviews earlier work and presents a brief outline of our investigations which confirm the findings of Frantzen. We also propose the adoption and use of the Frantzen schema for the A-D group. The schema is a practical one which affords the laboratory worker an accurate and definite means of identifying and reporting these microorganisms. It is neither our purpose nor desire to enter into controversy concerning the taxonomy or the nomenclature of the microorganisms discussed here. On the contrary, we wish only to propose the use of the Alkalescens-Dispar schema as a practical aid in laboratory work.

The methods used in this investigation were those advised by Kauffmann (*25*) for the study of the coli group. Except for type cultures obtained from various investigators, to whom we are greatly indebted, the microorganisms employed in the study were isolated by us or sent to the laboratory for identification. A large number of cultures of the more common O groups, 1, 2, and 3, were studied. Only a limited number of cultures of the other O groups were available.

In 1918, Andrewes (*1*) described *Bacillus alkalescens* as well as *Bacillus dispar* and *Bacillus ambiguus* (*Shigella dysenteriae* 2). Studies on the antigenic structure and relationships of *Shigella alkalescens* (A-D 01) were made by Neter (*28*), de Assis (*12*, *13*), Stuart et al. (*31*), and Wheeler et al. (*35*), and many others.

As pointed out by Stuart and co-workers (*31*) and Wheeler et al. (*35*), a large number of biochemical varieties of bacteria contain all, or a part, of the antigenic complex of A-D 01 (*S. Alkalescens*). These

Table 2. *The O antigen relationships of members of the Alkalescens-Dispar group*

[illegible] lescens-Dispar	O serums (A-D group)							
	01	02	03	04	05	06	07	08
01	[1] 20,480	[2] O	O	O	1,280	O	O	O
02	O	10,240	O	O	O	O	O	O
03	O	2,560	40,960	640	O	320	O	O
04	O	320	160	20,480	O	O	O	O
05	640	O	O	O	20,480	O	O	O
06 (121 C)	O	O	O	O	O	5,120	O	O
07	O	O	O	O	O	O	20,480	O
08	O	O	O	O	O	O	O	20,480

[1] Titers are expressed as the reciprocal of the highest dilution which gave visible agglutination.
[2] O equals negative at lowest dilution tested (1–40).

Table 3. *Results of agglutination tests with Alkalescens-Dispar serums and* E. coli *cultures*

100 C cultures *E. coli*	O serums (A-D group)							
	01	02	03	04	05	06	07	08
01	10,240	O	O	O	2,560	O	O	O
02a	O	O	O	O	10,240	O	O	O
02a, 2b	1,280	O	O	O	5,120	O	160	O
04	O	160	1,280	5,120	O	O	O	O
07	O	1,280	O	O	O	O	20,480	O
09	O	O	O	160	O	5,120	O	O
025	O	20,480	1,280	O	80	O	320	O
081	O	O	O	O	O	O	O	10,240

Table 4. *Results of agglutination tests with* E. coli *serums and Alkalescens-Dispar cultures*

100 C cultures Alkalescens-Dispar	O serums (*E. coli*)						
	01	02	04	07	09	025	081
01	20,480	1,280	O	O	O	O	O
02	O	O	640	O	O	20,480	O
03	O	O	5,120	1,280	O	10,240	O
04	O	O	20,480	320	O	2,560	O
05	1,280	20,480	O	O	O	O	O
06 (121 C)	O	O	O	O	20,480	O	O
07	O	O	1,280	20,480	O	1,280	O
08	O	O	O	O	O	O	20,480

biotypes range from the typical anaerogenic, lactose negative, nonmotile bacterium through intermediates to typical *E. coli* cultures.

De Assis (*12*) described a bacterium that was similar to *S. alkalescens* as regards its biochemical reactivities but which contained different O antigens. This serotype was called *Shigella alkalescens* II but was later named *Shigella tieté* by de Assis and by Weil and Slafkovsky (*34*). Neter (*28*) proposed a classification which contained four serotypes of *S. alkalescens*. These were: type I, the original *B. alkalescens* of Andrewes; type II, *S. alkalescens* II of de Assis; type III, 2–193 (2372) isolated by Ewing in Italy; and type IV, previously undescribed. Culture 2–193 is discussed below. Available cultures of type IV are rough (Frantzen, *18*).

In his publications of 1907 and 1912, Castellani (*7*, *8*) described two bacterial types which were designated *B. ceylonensis* B and *B. madampensis*. Another type, first isolated in 1904, was described by Castellani (*7*) as *B. ceylonensis* A (*Shigella sonnei*). Later, Castellani (*9*, *10*) classified these lactose-fermenting bacteria as metadysentery bacilli. Andrewes (*1*) described a species called *B. dispar* which consisted of a mixed collection of bacterial types, including both indol positive and indol negative microorganisms. Levine (*22*) pointed out that the indol negative *B. dispar* cultures of Andrewes were the same as Sonne's bacterium.

Welch and Mickle (*33*), Carpenter (*3*), and Carpenter and Stuart (*4*) adopted the names *B. dispar* and *S. dispar* for use in connection with the anaerogenic, nonmotile, indol positive serotypes that require 48 hours or longer to produce acid from lactose. Carpenter and Stuart (*6*) employed the term *Proshigella dispar* (Borman et al.) in connection with these microorganisms.

Carpenter (*3*) and Carpenter and Stuart (*4*) studied the relationships of *S. dispar* I (*Shigella madampensis*), *S. dispar* II (*Shigella ceylonensis* B), and *S. dispar* III. *S. dispar* II was subdivided into three subtypes, IIa, IIb, and IIc. Later, Carpenter (*5*) added a fourth subtype, IId. Frantzen (*18*) reported cultures of *S. dispar* IIa, IIb, IIc all contain identical O antigens, as demonstrated by reciprocal absorption tests employing antiserums prepared with boiled cultures. We confirmed this finding after being informed of the fact by Frantzen. Subtype IId was found to be identical serologically with *S. alkalescens* II or *S. tieté* (*16*). During the study of a large number of cultures that contain O antigens identical with those A-D 02 (*S. alkalescens* II), we found a series of biotypes comparable to that described by Stuart et al. (*31*) for A-D 01 (*B. alkalescens*, of Andrewes).

Frantzen (*18*) reported that the O antigens of *S. dispar* III (see *6*) are identical with those of *E. coli* 09 and that it contains *K* antigen A26. *S. dispar* III was added to the A-D group as O group 6 (table 1).

Culture 2–193 and 14 others like it were isolated by Ewing in Italy during 1944 and 1945. Subcultures of type 2–193 were sent to Neter (*28*) who classified it as *Shigella alkalescens* III and to Wheeler et al. (*35*) who studied culture 2–193 (Wheeler's accession No. 23732) and others like it and confirmed a serological relationship to *Shigella boydii* 5 previously noted by Ewing (unpublished data). Wheeler et al. (*35*) also mentioned the relationship of type 2–193 cultures to microorganisms now included in A-D 03. Other investigators (for example, see *4*) reported that type 2–193 cultures were identical serologically with typical members of *S. dispar* II (A-D 03). Francis (*20*) proposed that type 2–193 cultures be designated provisionally as *Shigella flexneri* VIII.

Type 2–193 cultures are regarded now as lactose-negative variants of A-D 03. They are included in the Frantzen (*18*) schema (table 1) as members of O group 3.

Francis (*20, 21*) reported that culture 2–193 was the same serologically and biochemically as culture 953 FA obtained from Dr. R. F. Bridges. Dr. Bridges sent Ewing a subculture of 953 FA in 1946 and supplied the following information about it: "As regards its origin, the original strain 953 FA was isolated by Lt. Col. D. T. M. Large, Royal Army Medical Corps, in Quetta about 1934 and sent to me at Kasauli for investigation. Subsequently I received several other strains of the same type, and I have notes of isolation in Rawal Pindi, and Kohat. So it seems that this type was widespread about the North-West Frontier of India, but certainly not common. I brought this strain 953 FA home with me from India in 1937." Bensted (*2*) 1939, also mentioned the isolation of type 953 cultures in a report from the Enteric Laboratory, Kasauli, India.

Ewing confirmed the findings of Francis as regards the identity of cultures 953 FA and 2–193. Therefore, available information indicates that these lactose-negative variants first were isolated in India about 1934. Cox and Wallace (*11*) reported the isolation of this type in India during World War II.

In 1942, Roelcke (*29*) recorded the isolation of a new type which was labeled *B. paradysenteriae palatinense*. Seeliger (*30*) studied this culture and found that it was identical to *S. madampensis* and *S. dispar* I. Roelcke's microorganism is not regarded as new but as a member of 04 of the A-D group.

All of the above-mentioned microorganisms now are included, along with several other serotypes, in the A-D group (table 1) of Frantzen (*18*).

New lots of antiserum for cultures S.171, S.167, S.205, and S.231 were prepared by injection of heated (100° C., 2½ hours) broth cultures into rabbits. These antiserums then were absorbed reciprocally with heated (100° C., 1 hour) suspensions of the four cultures. The results of absorption tests made with antiserums S.167, S.205, and S.231 (*S. dispar* IIa, IIb, and IIc, Carpenter) indicated that these microorganisms contain identical O antigens. This confirms the finding of Frantzen who reported that *S. dispar* IIa, IIb, and IIc do not differ from each other with respect to their O antigens, and that they all belong to A-D 03. The results of reciprocal absorption tests with antiserums S.171 (A-D 04, *S. dispar* I) and S.167 are essentially the same as those reported previously by various investigators. A-D 03 and A-D 04 are related slightly, but belong to separate O antigen groups.

Summary

A partial review of the literature on the subject of the Alkalescens-Dispar group (A-D group) is presented.

It is proposed that the antigenic schema of Frantzen should be adopted for use in the identification and reporting of these bacterial types. The A-D schema affords an accurate and practical method which laboratory personnel may utilize without reference to the problems of the taxonomic position of its members.

Data are presented which confirm the results of Frantzen as regards the O antigens of the members of the Alkalescens-Dispar group and their relationships to the coli group.

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Laboratory Tests On the Rapidity of Molluscacidal Action of Copper Sulfate in High Concentration

By M. O. Nolan*

The present short report is concerned with experiments which were carried out in the laboratory to ascertain if copper sulfate in concentrations of 20 parts per million (1:50,000) would kill nonoperculate snails within a few hours.

Three species of planorbid snails were used in the tests: *Australorbis glabratus*, *Biomphalaria boissyi*, and *Bulinus contortus*. The *Australorbis* snails were from our stock colony of Venezuelan strain reared in the laboratory for many generations. The *Biomphalaria* and *Bulinus* snails were also laboratory-reared from specimens received recently from Dr. Mahmoud Abdel Azim Bey of Egypt.

Experimental procedures in general complied with our standard pattern (*9*) for screening chemicals for molluscacidal activity. The chemical was diluted in volumetric flasks to 20 parts per million from an aqueous solution (1 gram copper sulfate crystals/99 milliliters water). Standing tap water (dechlorinated water), such as that used in the aquaria in which the snails were reared, was used throughout the experiments. According to an analysis of the water made in the chemistry laboratory,[1] the bicarbonate (HCO_3) content was 34.2 ppm; both carbonate (CO_3) and phosphate (PO_4) were 0.0 ppm. The pH of the water ranged from 7.8 to 8.0. After the addition of the copper sulfate in concentrations of 20 ppm, the pH ranged from 7.3 to 7.6. Average temperatures were 25° to 26° C.

Since our immediate objective in these experiments was to determine the killing efficiency of copper sulfate during the early hours of contact, the snails were immersed in water containing the chemical for periods of 1, 2, 3, 4, and 5 hours. A total of 40 snails of each species was used in each exposure period, 5 snails being immersed in 250 milliliters of the solution in a beaker (600 ml. capacity). Half of the beakers were aerated; the other half were unaerated. In addition, the effects of a 24-hour contact period were determined on 10 snails of each species. At the end of each contact period, the snails were removed from the chemically treated water and washed thoroughly in several changes of fresh water before being examined under a stereoscopic microscope. They were then transferred to fresh water, and thereafter examinations for viability and transfer to fresh water were made daily until the snails either died or revived. The number of snails determined as dead or revived in each group was recorded at each examination to gain some information on the rate of death or recovery following exposure. During the periods of observation following the contact period, aeration of the water was provided at all times and food (lettuce leaves) was made available to the snails.

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Anyone who has observed the reactions of planorbid snails to toxic compounds knows that it is not always wise to state with finality that a snail is dead, particularly if the observation is based on a macroscopic examination. A prostrate snail far retracted within its shell and with every appearance of lifelessness has been observed to revive in fresh water. There is no problem of uncertainty with snails that have been dead for some time and rigor mortis has set in, or the early stages of decomposition of the fleshy parts and an opaque appearance have developed. In the short-term exposure tests reported upon here, the criteria for death (based on an examination under the microscope) were cessation of heartbeat and the absence of response to tactile stimuli. Snails that were far retracted within their shells were gently prodded with a curved blunt needle for signs of life. The determination of recovery was based on the ability of the snail to move about or cling to the bottom and sides of the glass container.

The observed initial responses of the snails to the copper sulfate were alike for all three species. Upon contact with the chemically treated water, the snails immediately retracted within their shells and slowly dropped to the bottom of the container. The snails remained prostrate with no apparent movement throughout the experiment, including the postcontact period in fresh water, until death or revival resulted. There was considerable variation in the amount of contraction among individuals regardless of species.

In the aerated beakers there was always a flocculent precipitate of the chemical that was absent in the unaerated beakers. However, aeration of the chemically treated water seems to have played no significant role in the activity of the chemical. The final percentages of snail mortality following the 1- and 2-hour contact periods were slightly higher in the aerated beakers than in the unaerated, but not consistently so, and for longer hours of exposure the snail mortality was the same under both aerated and unaerated conditions. Consequently, in reporting results, the tests have been consolidated.

Results and Discussion

The results obtained are shown in the table. Copper sulfate in concentrations of 20 ppm killed all snails within the 24-hour contact period. The chemical did not kill any *A. glabratus* or *B. boissyi* within the actual contact periods ranging from 1 hour through 5 hours. The snails were obviously poisoned and subsequent death or revival in fresh water was slow, the postexposure period extending from 24 hours up to 4 days (*A. glabratus*) or 5 days (*B. boissyi*). After an immersion of 1 hour in the copper solution, 18 *A. glabratus* and 17 *B. boissyi*, almost half the number of each species exposed, were able to revive in fresh water; and after 5 hours of exposure to the copper both species showed some revival in fresh water. *B. boissyi* appeared to be more individually resistant than the other species of snails as shown by the variable numbers that finally succumbed or revived in fresh water after all hours (1 through 5) of exposure.

B. contortus was more susceptible to the copper than the other two species. These snails survived the 1- and 2-hour contact periods, but the majority of them died within 24 hours following their removal from the chemically treated water into fresh water. Dead snails were observed in increasing numbers at the end of each additional hour of exposure from 3 through 5 hours, and the snails that survived these exposures all died within the following 24 or 48 hours.

Comparative data on the toxicity of copper sulfate (20 parts per million) to three species of planorbid snails

Contact period (hours)	Dead snails	Post-contact period										Total snails		Mortality (percent)
		Number of snails dead or revived at—												
		24 hours		48 hours		72 hours		96 hours		120 hours				
		D	R	D	R	D	R	D	R	D	R	D	R	
Australorbis glabratus														
1	0	5	0	4	8	13	10	----	----	----	----	22	18	55
2	0	5	0	23	4	5	2	1	0	----	----	34	6	85
3	0	4	0	27	3	5	1	----	----	----	----	36	4	90
4	0	7	0	23	1	5	2	2	0	----	----	37	3	93
5	0	4	0	24	0	7	2	3	0	----	----	38	2	95
24	10	----	----	----	----	----	----	----	----	----	----	10	0	100
Biomphalaria boissyi														
1	0	7	12	5	2	11	2	0	1	----	----	23	17	58
2	0	4	4	12	3	14	1	----	----	1	1	31	9	78
3	0	0	0	13	8	10	5	0	1	0	3	23	17	58
4	0	2	0	16	4	12	6	----	----	----	----	30	10	75
5	0	0	1	20	4	6	6	0	1	0	2	26	14	65
24	10	----	----	----	----	----	----	----	----	----	----	10	0	100
Bulinus contortus														
1	0	28	0	3	2	2	3	0	2	----	----	33	7	83
2[1]	0	37	0	1	0	0	1	----	----	----	----	38	1	97
3	8	27	0	5	0	----	----	----	----	----	----	40	0	100
4	16	22	0	2	0	----	----	----	----	----	----	40	0	100
5	24	14	0	2	0	----	----	----	----	----	----	40	0	100
24	10	----	----	----	----	----	----	----	----	----	----	10	0	100

D=dead snails.
R=revived snails

[1] In the 2-hour test, inadvertently only 39 snails were used.

It must be borne in mind that in these laboratory tests conditions were what might be termed ideal for the copper salt to exert its maximum effects on the snails. All the factors that combine in natural fresh waters to inhibit the availability of the copper to snails were practically nonexistent or at a minimum in these experiments. Reference is made to the numerous plant and animal organisms in natural waters, the bacteria, algae, higher plants, protozoa and other aquatic animals, as well as the soil or mud, that adsorb or absorb copper; the minerals that precipitate and bind it, and the fatty acids and proteins in polluted waters that combine with it. There is no doubt that under these optimal conditions copper sulfate is a potent poison to snails. However, information is lacking on the rapidity of binding of the inorganic salt by such materials in natural waters as are listed above. Since field experience with copper sulfate has not been entirely encouraging, consideration should be given to the use of a combination of the inorganic copper salts with organic compounds that are known to have molluscacidal properties (1–9) and are stable in water.

Within recent years several workers have reported upon laboratory toxicity studies of copper salts (*10, 11, 12, 13*). Chandler (*14*) who was the first investigator to conduct systematic laboratory tests of copper sulfate for molluscacidal activity, pointed out that in the low concentrations of 2 ppm through 0.5 ppm, the salt killed snails within 48 hours. His criterion for death of the snails was failure to revive within 24 hours after being placed in fresh water. He made the interesting observation that a 2 ppm solution appeared to be no swifter in its action than was a solution of 0.5 ppm. In speculating that the poisoning effect of the copper salts might be due, at least in part, to inactivation of enzymes necessary to life, he commented that, if such is the case, the similarity in effect of such varying dilutions as 2 ppm and 0.5 ppm is more readily explained. Thirty years later, we know no more about the mechanism of the reaction responsible for the effect on snails of copper or other toxic agents. In accordance with established facts concerning the biological activity of inorganic copper salts, we can still only speculate that the sulfhydryl and/or other enzymes may be inactivated and this disruption of the intracellular metabolism leads to the death of the snail. Investigations of the physiological effects of toxic agents to snails are under way in the Laboratory of Tropical Diseases, and it is hoped these studies will lead to a more fundamental basis for snail control.

Summary

Tests were carried out in the laboratory to determine if copper sulfate in the high concentration of 20 parts per million would be quickly lethal to planorbid snails (*A. glabratus*, *B. boissyi*, and *B. contortus*).

Under conditions considered optimum for maximal toxic action, the copper salt did not kill *A. glabratus* or *B. boissyi* within contact periods of 1 through 5 hours. Based on subsequent death of the snails in fresh water, the percentages of mortality for each hour of exposure from 1 through 5 were: *A. glabratus*, 55, 85, 90, 93, 95; *B. boissyi*, 58, 78, 58, 75, 65. *B. contortus* snails were more susceptible to the copper than the other two species. They survived the 1- and 2-hour contact periods, but the majority of them died within 24 hours following their removal from the chemically treated water into fresh water. Dead snails were observed in increasing numbers at the end of each additional hour of exposure from 3 through 5 hours, and the snails that survived these exposures all died within the following 24 or 48 hours.

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Incidence of Disease

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

Reports from States for Week Ended October 21, 1950

New cases of acute poliomyelitis reported in the United States during the current week numbered 1,551, a slight decrease from the 1,596 cases reported for the preceding week. This is the fourth consecutive week since May 20 that a decrease from the preceding week has been reported. The figure for this week is higher than the corresponding number (1,147) for 1949.

The cumulative total (25,384) for the current "disease" year was below the corresponding total (36,147) for last year, the highest on record. The "disease" year for acute poliomyelitis begins with the twelfth week of the calendar year. The cumulative total for the

Comparative Data for Cases of Specified Reportable Diseases: United States

[Numbers after diseases are International List numbers, 1948 revision]

Disease	Total for week ended		5-year median 1945–49	Seasonal low week	Cumulative total since seasonal low week		5-year median 1944–45 through 1948–49	Cumulative total for calendar year		5-year median 1945–49
	Oct. 21, 1950	Oct. 22, 1949			1949–50	1948–49		1950	1949	
Anthrax (062)	3	1	(1)	(1)	(1)	(1)	(1)	39	42	(1)
Diphtheria (055)	209	229	315	27th	1,556	2,197	2,822	4,684	5,965	9,119
Acute infectious encephalitis (082)	21	15	15	(1)	(1)	(1)	(1)	784	647	529
Influenza (480–483)	1,845	1,285	1,688	30th	12,922	9,357	10,219	259,181	85,224	152,057
Measles (085)	998	674	922	35th	4,604	3,806	4,647	292,775	592,324	558,200
Meningococcal meningitis (057.0)	72	70	62	37th	298	259	259	3,097	2,775	2,870
Pneumonia (490–493)	923	990	-------	(1)	(1)	(1)	(1)	[2] 67,741	63,755	-------
Acute poliomyelitis (080)	1,551	1,147	976	11th	[3] 25,384	36,147	21,195	[3] 26,516	37,000	21,662
Rocky Mountain spotted fever (104)	3	6	5	(1)	(1)	(1)	(1)	444	547	532
Scarlet fever (050)	778	795	1,066	32d	4,354	4,673	5,844	44,524	62,339	67,801
Smallpox (084)	-----	------	1	35th	1	3	5	27	44	152
Tularemia (059)	8	16	15	(1)	(1)	(1)	(1)	753	951	799
Typhoid and paratyphoid fever (040, 041)[4]	56	84	84	11th	2,388	2,878	2,878	2,898	3,366	3,366
Whooping cough (056)	1,473	1,369	1,539	39th	[5] 4,366	4,178	4,563	[5] 101,561	50,780	80,438

---

[1] Not computed.

[2] Addition: Tennessee, week ended Oct. 14, 38 cases.

[3] Addition: Iowa, delayed report, 20 cases. Deductions, Maryland and Michigan, week ended Oct. 14, 1 case each.

[4] Including cases reported as salmonellosis.

[5] Deductions: Iowa, weeks ended Sept. 2 and 9, 2 and 10 cases, respectively.

calendar year was 26,516, compared with the total of 37,060 for the corresponding period last year.

For the current week, five of the total of nine geographic divisions decreased in reported cases of acute poliomyelitis from the preceding week. These decreases ranged from 37 (458 to 421) cases reported in the East North Central States to 9 (60 to 51) in the New England States. Increases were noted as follows: West South Central States, 35 (94 to 129) cases; Middle Atlantic States, 21 (326 to 347); Pacific States, 8 (119 to 127); and the West North Central States, 2 (163 to 165).

For the current week, the States reporting the largest numbers of cases were: New York (235), Michigan (125), Illinois (116), Texas (87), Ohio (78), and California (72).

Alaska reported 5 cases compared with 9 last week. The cumulative total for the calendar year was 45. Hawaii reported 2 cases for the week.

The total number of cases of diphtheria reported for the week was 209 compared with 171 last week and 229 for the corresponding period last year. For the calendar year, a total of 4,684 cases was reported, the lowest total number reported for corresponding periods in the past 5 years.

The total number of reported cases of meningococcal meningitis for the current week was 72 compared with a total of 70 cases for the corresponding week last year, and the 5-year (1945–49) median of 62 cases.

Deaths During Week Ended October 21, 1950

	Week ended Oct. 21, 1950	*Corresponding week, 1949*
Data for 93 large cities of the United States:		
Total deaths	9,232	8,859
Median for 3 prior years	8,859	----------
Total deaths, first 42 weeks of year	383,379	382,993
Deaths under 1 year of age	532	643
Median for 3 prior years	698	----------
Deaths under 1 year of age, first 42 weeks of year	25,920	27,400
Data from industrial insurance companies:		
Policies in force	69,591,544	70,103,695
Number of death claims	12,667	12,220
Death claims per 1,000 policies in force, annual rate	9.5	9.1
Death claims per 1,000 policies, first 42 weeks of year, annual rate	9.2	9.1

Reported Cases of Selected Communicable Diseases: United States, Week Ended Oct. 21, 1950

[Numbers under diseases are International List numbers, 1948 revision]

Area	Diphtheria (055)	Encephalitis, infectious (082)	Influenza (480–483)	Measles (085)	Meningitis, meningococcal (057.0)	Pneumonia (490–493)	Poliomyelitis (080)
United States	209	21	1,845	998	72	923	1,551
New England	1	3	4	37	3	39	51
Maine				1	2	3	3
New Hampshire			4		1		
Vermont				2			3
Massachusetts		3		15			23
Rhode Island	1			3		2	1
Connecticut				16		34	21
Middle Atlantic	6	3	4	254	27	277	347
New York	6	3	[1] 1	86	17	166	235
New Jersey			3	52	2	60	47
Pennsylvania				116	8	51	65
East North Central	8	4	25	208	12	103	421
Ohio	3		3	27	6		78
Indiana	4		18	5		11	35
Illinois	1		1	51	5	56	116
Michigan		3	2	21	1	30	125
Wisconsin		1	1	104		6	67
West North Central	9	2	2	43	4	52	165
Minnesota	3		1	8	1	18	26
Iowa	1			11		7	59
Missouri	4	1	1	7	2	3	23
North Dakota		1		7		17	1
South Dakota				2			1
Nebraska							21
Kansas	1			8	1	7	34
South Atlantic	75		339	99	11	106	203
Delaware				2			4
Maryland	1			4		18	52
District of Columbia			2			14	
Virginia			266	11	1	43	48
West Virginia	4		52	65	1	2	25
North Carolina	26			10	5		32
South Carolina	9		13	1	2	12	12
Georgia	28		2	2	1	8	19
Florida	7		4	4	1	9	11
East South Central	52	1	29	22	4	48	70
Kentucky	10			2		8	34
Tennessee	11	1	16	10	3		30
Alabama	16		11	5		16	2
Mississippi	15		2	5	1	24	4
West South Central	46		1,311	85	4	212	129
Arkansas	10		143	8		11	10
Louisiana	4			1		12	14
Oklahoma	5		56	4		9	18
Texas	27		1,112	72	4	180	87
Mountain	7	1	114	100		45	38
Montana	2		8	2		1	
Idaho			23	1		7	6
Wyoming				1		2	1
Colorado			13	52		16	4
New Mexico	1	1		1		2	9
Arizona	3		69	9		16	10
Utah	1		1	34		1	8
Nevada							
Pacific	5	7	17	150	7	41	127
Washington				47	4		25
Oregon	2		8	10	2	12	30
California	3	7	9	93	1	29	72
Alaska						5	5
Hawaii			3	7			2

[1] New York City only.

Anthrax: Pennsylvania, 3 cases.

Reported Cases of Selected Communicable Diseases: United States, Week Ended Oct. 21, 1950—Continued

[Numbers under diseases are International List numbers, 1948 revision]

Area	Rocky Mountain spotted fever (104)	Scarlet fever (050)	Smallpox (084)	Tularemia (059)	Typhoid and paratyphoid fever[1] (040,041)	Whooping cough (056)	Rabies in animals
United States	3	778	------	8	56	1,473	108
New England	------	48	------	------	1	195	------
Maine	------	5	------	------	------	45	------
New Hampshire	------	------	------	------	------	------	------
Vermont	------	5	------	------	------	36	------
Massachusetts	------	28	------	------	1	60	------
Rhode Island	------	------	------	------	------	27	------
Connecticut	------	10	------	------	------	27	------
Middle Atlantic	------	102	------	------	12	246	23
New York	------	[2] 55	------	------	4	96	22
New Jersey	------	9	------	------	2	93	------
Pennsylvania	------	38	------	------	6	57	1
East North Central	------	185	------	2	7	378	14
Ohio	------	48	------	------	3	62	2
Indiana	------	19	------	------	2	45	------
Illinois	------	35	------	2	1	74	1
Michigan	------	61	------	------	1	121	10
Wisconsin	------	22	------	------	------	76	1
West North Central	------	21	------	------	------	144	10
Minnesota	------	6	------	------	------	18	------
Iowa	------	1	------	------	------	40	10
Missouri	------	8	------	------	------	12	------
North Dakota	------	1	------	------	------	26	------
South Dakota	------	1	------	------	------	7	------
Nebraska	------	------	------	------	------	------	------
Kansas	------	4	------	------	------	41	------
South Atlantic	3	145	------	2	10	120	14
Delaware	------	1	------	------	------	3	------
Maryland	------	8	------	------	2	20	------
District of Columbia	------	6	------	------	------	3	------
Virginia	1	21	------	1	1	12	1
West Virginia	------	11	------	------	1	24	2
North Carolina	2	70	------	------	3	34	------
South Carolina	------	8	------	------	1	3	5
Georgia	------	19	------	1	2	8	6
Florida	------	1	------	------	------	13	------
East South Central	------	108	------	1	7	69	17
Kentucky	------	23	------	------	------	32	9
Tennessee	------	51	------	------	6	19	4
Alabama	------	24	------	------	1	14	3
Mississippi	------	10	------	1	------	4	1
West South Central	------	54	------	2	11	158	25
Arkansas	------	5	------	1	------	16	3
Louisiana	------	6	------	1	5	------	------
Oklahoma	------	9	------	------	1	10	2
Texas	------	34	------	------	5	132	20
Mountain	------	19	------	1	4	101	1
Montana	------	6	------	------	------	7	------
Idaho	------	1	------	------	1	11	------
Wyoming	------	------	------	1	1	------	------
Colorado	------	6	------	------	------	14	------
New Mexico	------	1	------	------	1	37	------
Arizona	------	1	------	------	1	30	1
Utah	------	4	------	------	------	2	------
Nevada	------	------	------	------	------	------	------
Pacific	------	96	------	------	4	62	4
Washington	------	31	------	------	1	4	------
Oregon	------	9	------	------	------	5	------
California	------	56	------	------	3	53	4
Alaska	------	------	------	------	------	2	------
Hawaii	------	------	------	------	------	2	------

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[1] Including cases reported as salmonellosis.

[2] Including cases reported as streptococcal sore throat.

FOREIGN REPORTS

CANADA

Reported Cases of Certain Diseases—Week Ended Sept. 30, 1950

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Brucellosis	--------	--------	--------	--------	2	1	1	--------	--------	--------	4
Chickenpox	--------	--------	18	--------	28	74	26	27	45	27	245
Diphtheria	--------	--------	--------	--------	5	1	--------	1	--------	1	8
Dysentery, bacillary	--------	--------	--------	--------	6	16	1	--------	--------	1	24
Encephalitis, infectious	--------	--------	--------	--------	--------	--------	--------	2	--------	--------	2
German measles	--------	--------	9	--------	1	56	--------	6	16	4	92
Influenza	--------	--------	23	--------	--------	--------	2	--------	--------	--------	25
Measles	--------	--------	3	--------	56	183	7	4	2	14	269
Meningitis, meningococcal	--------	--------	--------	--------	--------	--------	--------	1	--------	--------	1
Mumps	--------	--------	5	--------	71	99	8	38	66	18	305
Poliomyelitis	--------	--------	1	--------	2	27	--------	14	5	2	51
Scarlet fever	6	--------	--------	6	29	30	21	10	22	12	136
Tuberculosis (all forms)	13	--------	1	5	137	41	30	16	--------	28	271
Typhoid and paratyphoid fever	--------	--------	--------	2	8	--------	--------	--------	1	5	16
Venereal diseases:											
Gonorrhea	4	--------	15	5	66	69	24	23	44	64	314
Syphilis	5	--------	11	4	61	17	5	8	4	13	128
Primary	--------	--------	1	2	9	3	--------	4	--------	--------	19
Secondary	--------	--------	--------	--------	6	3	--------	--------	1	1	11
Other	5	--------	10	2	46	11	5	4	3	12	98
Other forms	--------	--------	--------	--------	--------	--------	1	--------	--------	--------	1
Whooping cough	--------	--------	12	7	99	113	38	6	7	16	298

NORWAY

Reported Cases of Certain Diseases—July 1950

Disease	Cases	Disease	Cases
Diphtheria	8	Pneumonia (all forms)	1,698
Dysentery, unspecified	4	Poliomyelitis	67
Encephalitis, infectious	1	Rheumatic fever	75
Erysipelas	267	Scabies	461
Gastroenteritis	3,400	Scarlet fever	97
Hepatitis, infectious	50	Tuberculosis (all forms)	230
Impetigo contagiosa	1,216	Typhoid fever	3
Influenza	3,015	Venereal diseases:	
Malaria	1	Gonorrhea	204
Measles	406	Syphilis	43
Meningitis, meningococcal	13	Other forms	3
Mumps	92	Whooping cough	1,584
Paratyphoid fever	1		

SCARLET FEVER IN GERMANY AND IN YUGOSLAVIA

According to information received through the World Health Organization the incidence of scarlet fever has been increasing in both the German Federal Republic and Yugoslavia since April 1950.

For the period April 1–September 15, 1950, 36,199 cases of the disease were reported in the German Federal Republic. Reported incidence for the same period in preceding years is as follows: 1947—10,396; 1948—19,453; 1949—26,209.

Five thousand three hundred and thirty-eight cases were reported in Yugoslavia for this period during the current year. Figures for the comparable periods of the three preceding years are as follows: 1947—1,242; 1948—977; 1949—2,296.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India. During the week ended October 14, 1950, 173 cases of cholera, with 32 deaths, were reported in Madras.

Plague

Belgian Congo. On October 9, 1950, one fatal case of pneumonic plague was reported in Costermansville Province at Butongole, north of Lubero.

Brazil. During the month of August 1950, 13 cases of plague, one fatal, were reported in Brazil by States as follows: Alagoas 3; Bahia 7 (1 death); Ceara 2; Pernambuco 1.

Smallpox

India (French). During the period September 17–30, 1950, 69 cases of smallpox were reported in Pondicherry.

Rhodesia (Southern). Eighty-six cases of smallpox with 10 deaths were reported in Southern Rhodesia during August 1950.

Typhus Fever

Ethiopia. During the period June 25–July 22, 1950, 170 cases of typhus fever, 8 fatal, were reported.

Spain. During the week ended September 9, 1950, two cases of typhus fever were reported in Madrid.

Plague Infection in Bernalillo County, N. Mex., and Dallam County, Tex.

New Mexico

A report, dated October 20, 1950, states that plague infection was proved positive in 17 fleas taken from 2 wood rats, *Neotoma*, trapped approximately 17 miles east of Albuquerque, in Bernalillo County. The wood rats were trapped under date of April 22, 1950.

Texas

A memorandum, dated October 20, 1950, states that plague infection was proved positive in the following specimens: 118 fleas from 1 prairie dog, *Cynomys ludovicianus*, shot October 10, 1950, and 118 fleas flagged October 7, 1950, from prairie dog burrows. These specimens were taken 2½ miles west of Perico in Dallam County.

Examination for Dental Officers

A competitive examination for appointment of dental officers in the Regular Corps of the Public Health Service will be held January 15, 16, and 17, 1951, in various cities throughout the country. Completed applications must be in the Washington office by December 11.

Appointments will be made in the grades of assistant and senior assistant dental surgeon, equivalent to Navy ranks of lieutenant, j. g., and lieutenant, respectively. Entrance pay is $5,686 for assistant, and $6,546 for senior assistant (with dependents). These figures include the $1,200 annual additional pay received by dental officers as well as subsistence and rental allowance. Applicants must be citizens and graduates of an approved school of dentistry. The assistant must have 7 years and the senior assistant 10 years of educational training and professional experience subsequent to high school.

The written professional examination will include the following subjects: oral surgery, oral medicine, oral pathology and bacteriology, anatomy, pathology and bacteriology (general), physiology, pharmacology, operative dentistry, prosthetic dentistry, dental materials, periodontia, roentgenology, public health, and pedodontia.

The practical examination will include an amalgam restoration; a gold inlay; and a complete write up of diagnostic procedures and treatment.

For application forms and additional information write to: Surgeon General, Public Health Service, Federal Security Agency, Washington 25, D. C. Attention: Division of Commissioned Officers.

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The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

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Public Health Reports

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FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
G. St. J. Perrott, Chief of Division

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Public Health Reports

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Health Resources in Defense of the Nation

"A strong, healthy, working population is as essential as a strong fighting force . . ."

This was more than a lead-in statement to a panel discussion on the medical aspects of civil defense. Succinctly, it expressed the theme motivating week-long (October 23–27) discussions, sessions, and seminars of the Association of State and Territorial Health Officers.

The remark itself was among those made by Dr. Leonard A. Scheele, Surgeon General, Public Health Service, on a Columbia Broadcasting System interview, October 26. Dr. Wilton L. Halverson, President of the Association and Director of Health for California, and Dr. Herman E. Hilleboe, Commissioner of Health for New York, completed the guest panel. The voice of the inquiring reporter belonged to CBS's Alex Kendrick.

During a recess the three public health officials had hurried to the CBS studio from the Annual Conference of the Surgeon General and the Chief of the Children's Bureau with the State and Territorial Health Officers, the State Mental Health Authorities, and Representatives of the State Hospital Survey and Construction Authorities. It was the forty-ninth such conference. The surroundings were the same as a year ago—the auditorium of the Federal Security Building in the Nation's Capital. Many in attendance were the same persons who registered for the conference a year ago. Most of the committees were the same. But with that the similarity vanished.

For what had been an undertone, a cautious paragraph of forewarning a year ago, was now being heard in amplified and ominous urgency. More than once, and in a dozen different ways, the conference heard officials and leaders emphasize the essentiality of a healthy Nation to

This issue was prepared by the editorial staff of PUBLIC HEALTH REPORTS, Taft Feiman, Chief; Winona Carson, Lee Michelson, and Emily Johnson. Grateful acknowledgment is made of assistance given by Ruth Lauder and Harold Tager, information specialists, Public Health Service, and Joseph G. Riddle, information specialist, Children's Bureau.

support the forces committed to military action. All were agreed that public health programs and progress not only had to be maintained but that public health agencies, voluntary and official, had to start immediately to provide adequate health and medical defense machinery.

How was this to be accomplished? What has been done to integrate the health agencies and the health workers with defense planning? How were personnel and matériel needs of these programs to be met? How were staffs on continuing health programs to be manned in face of military call-ups? What was the role of the health defense setup in the case of atomic attack? In the case of biological warfare? What was the best method in organizing State and local health defense systems? What were mutual aid pacts? What impact will the "doctor draft" have on public health services?

These were the concerns of the 1950 conference, these and a hundred other questions, much more specific, and all of them important. The health officers listened, asked, and then, expertly recommended and guided.

PUBLIC HEALTH REPORTS does not have the space to print the proceedings word for word. But it was felt that at least a digest of the conference ought to be attempted for the immediate benefit of health workers all over the Nation. In preparing such a digest, remarks have to be condensed, pulled out of context, and a great deal of selectivity exercised. *Although quotation marks are not used in this report, it is clear that these are condensed remarks made by the speakers, with essentiality of the subject matter the prime consideration in the editing of them.* In appropriate positions in the text will be found condensations of most of the recommendations of the conference.

Civil Defense

Scheele . . . Health Prime Aid to Defense

The larger design developing for the defense of the Nation and for the defense of democracy throughout the world is threefold, said Leonard A. Scheele, Surgeon General of the Public Health Service.

Each element is of equal importance:

First, military defense to be ready for emergencies, and to strengthen our allies.

Second, civil defense, to place the Nation in readiness for enemy attack at home, open or clandestine.

Third, technical and economic assistance to underprivileged peoples of the world so that they may withstand the false promises of communism and fascism.

In the long run—and it will be a long run—a strong, expanding health program will be the most effective way of assuring a strong Nation, capable of supplying the demands of the military for manpower and matériel, and capable of organizing and operating its own civil defense. The Public Health Service believes, therefore, that any major reduction in civilian health services would be both unwise and uneconomical. Every set-back that our public health program suffers is a set-back for national defense.

The Public Health Service has had a task force of some of its top officers working for the past 2 months with Dr. Kiefer's group (NSRB) on plans for emergency health and medical services. The manual, "United States Civil Defense" outlines the broad plan. The manual on health and medical services will soon be ready.

Local Nerve Centers

One factor is of special interest. State organization for civil defense is stressed more than during the emergency of 10 years ago. A strong State organization will be necessary to act as a nerve center through which attacked areas may be served and to assure adequate mutual aid.

One phase of our planning for civil defense should be emphasized—a phase likely to be passed over lightly in our natural response to the frightening prospect of having to deal with tens of thousands of dead and critically injured people. This is the prospect of hundreds of thousands of people who may be suddenly bereft of food, clothing, shelter—and all the normal public health services. A safe and adequate supply of water; protection against epidemics; medical and nursing care for all those health emergencies which inevitably arise even under normal conditions; all these are essentials. The threat of panic among these hundreds of thousands of people requires not only police skills—but rather, primarily, the skills of health and social workers. The first essential is advance education of the public. Next, speedy relief of discomfort, hunger, and thirst; speedy assurance of health protection. These are the best means of allaying fear and averting panic.

The restoration and protection of health services should receive the same emphasis and attention in planning as rescue, casualty service, burial, information center, and so on. The Nation's health agencies are the logical sources of planning and organization in this area of civil defense. They possess the knowledge, skills, and the trained, full-time staffs to undertake the responsibility, and the NSRB has recommended that the State and local health departments serve in that capacity.

There are many problems of supply in emergency health and medical services. One of the most critical is the storage of blood, blood derivatives, and blood substitutes. The Public Health Service is working on these problems.

Salt-Soda for Shock

Recently, the Surgery Study Section of the National Institutes of Health recommended that the Public Health Service release information on the value of oral salt-soda solution in the emergency treatment of shock. A review by the Surgery Study Section has shown that the administration of large quantities of salt solution by mouth during the first 24 hours will prevent shock and death in a high proportion of burn and wound casualties.*

Mass Blood Typing

Several communities are developing plans for mass blood typing of the general population, on the ground that such advance typing might afford additional protection to the people in the event of severe enemy attack. Other communities are eager—some, anxious—to know what course to take.

The basis for community concern is the assumption that large numbers of injured persons will immediately need whole blood transfusions. Actually, plasma and plasma substitutes, such as oral salt-soda solution—which require no typing—will be the emergency treatment of choice in the event of disaster. When critically injured persons arrive at the hospital for definitive care, they can be typed quickly and the donors or stored blood can be cross-matched at the same time. The major need will be for type O (low titer) blood.

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*The October 13 issue of Public Health Reports contains the report of the Study Section as well as the report by Dr. Carl A. Moyer, Dean of the Southwestern Medical School, University of Texas, to the National Security Resources Board on oral salt-soda solution.

Governmental agencies and professional societies at the present time think that any State or local plans for blood typing should conform with the National Civil Defense Program and the National Blood Program, in cooperation with the American Association of Blood Banks, the national American Red Cross, the American Medical Association, and the American Hospital Association. When typing is done, principal emphasis should be placed on typing people who will give blood either in advance for storage in blood banks or for use at the time of an emergency.

The chief reason for concentrating on a limited group at the present time is that our immediate need is to identify type O donors in advance. Since only persons between 18 and 60 years are potential donors, the search for type O donors should be concentrated in those population groups. Later, blood-specific typing of the general population may be feasible.

There are many practical and technical difficulties involved in mass blood typing which may be overcome in time. At present, the demands which mass blood-typing campaigns would place on manpower and supplies of typing serum, plus the risk of errors made by hastily trained personnel, should be taken into account. We feel that any mass blood typing of the general population at this time would be undertaken as a calculated risk, and at a time when there is reasonable doubt regarding the method's effectiveness. Undoubtedly, the forthcoming manual of the National Security Resources Board on health and medical services will make recommendations regarding the blood program.

Kiefer . . . Organize State Health Resources

The civil defense program for this country must be in constant readiness because for the first time in 136 years an enemy has the power to attack our cities in strong force, and for the first time in our history that attack may come suddenly, with little or no warning, Dr. Norvin C. Kiefer, Director, Health Resources Office, National Security Resources Board, told the health officers.

Granted a few minutes warning, casualties could be reduced by over 50 percent through proper organization and training in civil defense. More important, civil defense could spell the difference between defeat with slavery for our people and victory in a war thrust upon us.

Quoting these warning phrases from the manual, "United States Civil Defense," Dr. Kiefer went on to state that the planning and operating areas involve practically all of the skills, knowledge, and experience used daily in peacetime programs, and a number of new skills will have to be added. Radiological monitoring, city-wide radiological safety measures, and decontamination procedures constitute new and difficult fields.

He reported that about 150 physicians and 85 specially qualified persons have already been trained in medical aspects of atomic warfare and in radiological defense measures by the Atomic Energy Commission, and they form the nucleus for teaching in their States. Nurses are presently being called for a similar training course.

However, we should not become so engrossed with special weapons defense measures and with the methods of treatment of injuries peculiar to special weapons that we lose sight of the most important task—the provision of an organization, with adequate supplies and hospital facilities, to care for tens of thousands of living casualties, most of whom would be suffering from burns, shock, lacerations, and other mechanical trauma.

Will Have Manual

A health and medical defense services manual to guide health agencies and organizations will contain detailed suggestions for organization, facilities, equipment, and supplies. Each State will have to adapt these plans to fit conditions that are peculiar to it.

Around each critical target area within each State there are mutual aid circles. At the time of attack, communities within these circles would spontaneously send their medical facilities into the attacked area. Mobile support, in the form of groups that include self-contained teams for police, fire, rescue, and health work, would be dispatched by the State on notification of attack.

Saturation of all defense facilities to a point of uselessness now can be accomplished with a single bomb unless we are organized to handle mass problems.

Steps to Take Now

1. State medical, dental, nurses, veterinary, hospital, and related associations are ready and eager to get to work on civil defense. Use them on advisory committees, important positions in your organization, and deputize them, if necessary, to give them sufficient authority in time of disaster. Avoid use of military personnel for key spots since it invites collapse of organization when reassignment of the military personnel to another area occurs.

2. Familiarize yourself with all health resources in your State. Federal stores of consumable supplies and related items will be located near critical target areas, sufficiently removed from the potential attack zone. These supplies will be available to supplement local supplies.

3. Learn the assumed critical target areas in your State.
4. Stimulate local organization of local civil defense health services.
5. Read the recent publication of the Atomic Energy Commission, "The Effects of Atomic Weapons."

Hilleboe . . . New York Defense Plan

New York State is producing a sound civil defense plan, Dr. Herman E. Hilleboe, New York State Commissioner of Health, announced in reporting his observations of the English program as well as his experience in developing a program for New York.

Dr. Hilleboe went to England to study the defense measures there and to draw from English experience with aerial bombing the defense, medical, and rescue lessons needed to save effort and costly mistakes in planning for defense against atomic attack.

The New York State Health Department has the responsibility of State-wide planning for the medical and public health activities of the civil defense program. Additional duties are coordinating local resources, training teachers and key personnel, stockpiling State supplies and handling Federal supplies allocated to the State, and making special studies to improve medical procedures used in civil defense. The State's coordinating activities include Federal-State, interstate, and interdepartmental relations, and proper liaison between the department of health and the civil defense commission. In addition, a two-way channel must be kept open between the State and the county and city health departments.

Advisory System

Advisory committees must be kept few in number and as small as possible, otherwise too much time of operating personnel will be taken up going to meetings, making and listening to speeches, and important work will be delayed. The pattern used in New York State is a simple one. The two principal committees are (1) the health resources committee which includes representatives from the major health groups in the State—official and voluntary; (2) the medical advisory committee of the Medical Society of the State of New York which includes the president of the Society and the chairmen of the various special committees involved in civil defense. Specifically, these are the committees on health preparedness, public health and education, and blood banks. When special problems arise, one of the members of the medical advisory committee is appointed chairman of a small subcommittee which reports back to the medical advisory committee. In this way, one main committee keeps all advisory activities under control.

For example, the chairman of the health preparedness committee called a meeting of the clinical specialists from the nine medical schools in New York State to establish uniform procedures for emergency treatment of burns, shock, and fractures—a step extremely important in the interchange of personnel and in determining what supplies must be stockpiled. This chairman will report back to the medical advisory committee and the committee will report to the State commissioner of health, who serves as the medical member of the State civil defense commission and reports to its chairman.

Training Program

The health department has developed a State-wide plan which places the office of medical defense in the executive division of the commissioner until the permanent status and function of this office is determined. Key personnel throughout the department have been assigned special tasks on a part-time basis. Their activities in civil defense are coordinated by the health department's office of medical defense, with major policy decisions cleared through the commissioner of health. These public health experts call upon department advisors and consultants for advice.

The department has prepared a basic guide for emergency medical and public health services for cities and local communities; it reviews local plans to determine the best use of doctors and other professional personnel, and has established regional units which can be strategically utilized, singly or in multiples, in the event of attack. A public health physician is assigned full time to the civil defense commission to act as an alternate member of the central headquarters control staff. He also determines what resources and personnel will compose mobile columns that will be sent to areas of devastation.

Early in 1949 the New York State Department of Health sent a number of its physicians and engineers to Washington for civil defense training courses. These men served as instructors for other members of the State health department. In June 1950, a training program was arranged for all practicing physicians.

Subjects taught include the role of the health officer in medical preparedness against atomic disaster, a discussion of the problems encountered at the time of explosion, a discussion of radiation syndrome in man, a presentation of elementary nuclear and radiation physics, the biologic and genetic effects of radiation, the pathology and treatment of victims of an atomic explosion, and a discussion of radiation detection and measurement instruments.

A 1-day teaching course in each area of the State proved sufficient for orientation of general practitioners. Ninety-six 1-day teaching courses have been arranged for nearly 10,000 physicians in upstate New York. Attendance so far has been well over 80 percent of the registered physicians in the area. In addition, 60 sessions have been planned for physicians in New York City. Also to be trained will be 500 licensed osteopaths and about 50,000 registered professional nurses and licensed practical nurses. The training of lecturers and the preparation of detailed curricula require the highest degree of competence from the health department and the medical schools.

Principal target areas have been indicated and special attention has been given to the resources in the vicinity of the target areas. For example, plans for Suffolk, Nassau, and Westchester, which adjoin the metropolitan areas, are extremely important in the event that New York City is hit. Target areas must be concerned primarily with self help and secondarily as sources of help to other target areas.

In nontarget areas, the major emphasis of defense activities is on mutual assistance. The target areas would be helpless to take care of their injured without aid from supporting areas. Furthermore, emergency hospitals, supply depots, and evacuation centers will be located in the nontarget areas. Mobile primary-aid post teams will be mobilized from these areas. In the more distant areas from the targets, permanent hospitals will provide treatment that will avoid unnecessary disability and will put people back to work and normal activity as quickly as possible.

Local Planning

Local plans are being developed on the pattern of the State's basic guide for medical services in civil defense. Each local plan should contain a clear statement of needs, both immediate and long range. Objectives of the local plan must be clearly defined. Finally, the special activities of different types of medical personnel should be foreseen as realistically as possible and described in detail.

In the local area the public must be prepared to accept the risk of possible attack by atomic bombs and also to accept the responsibility of giving mutual aid to other parts of the State. The latter is the more difficult of the two. If people understand the purpose of civil defense and participate in it, they will be better able to meet their individual emotional crises. A sound plan helps to avoid group panic and fear and can reduce the damage that might be done to those who make a frenzied attempt to escape when the area is hit.

First, direction must be provided for the lost and the fearful so that they will not wander into dangerous areas. Boys between the ages of 12 and 15 will probably make effective messengers and guides for the hysterical. Second, casualty information must be collected centrally so that correct information may be promptly given to relieve the anxiety of relatives and friends.

One of the major tasks of the local community is to train and retain the thousands of volunteer workers of all types needed to participate

..t the local medical defense program. If attack does come, local groups should know that the State is prepared to extend the services of mobile columns to any part of the State. These, however, cannot be moved unless they have been properly trained and organized upon the same basic plan that is used in the area of attack.

The magnitude of civil defense against atomic attack baffles the imagination. The destructive power of the atomic bomb and the inadequacy of any military defense against it make complete security impossible. We are amateurs in chaos. Under the burden of known destruction that even one atomic bomb can cause, we must admit that we shall succeed in our humane intentions only if we can reduce the probable number of the dead, minister to the injured, and ease the anguish and suffering of the stricken.

The atomic bomb produces no new or mysterious illness. The medical profession has been familiar for many years with the effects of ionizing radiation on the body. The problem posed by such an attack is one of medical logistics—a race against time to get sufficient personnel and supplies to one or more cities in the State within hours.

Habel . . . Role of Laboratories

In civil defense, health and medical services will be the responsibility of the same organizations and individuals as in peacetime, but they will operate under civil defense laws, regulations, and authority, stated Dr. Karl Habel, Chief of the Laboratory of Infectious Diseases, Microbiological Institute, National Institutes of Health, in summarizing a formal report written by Dr. Victor H. Haas.*

Laboratories without health or medical functions should be inventoried and personnel be given orientation to enable them to fit into the civil defense scheme on instant notice. Priorities for laboratory services should be established which would be enforced by the civil defense health director.

In planning, the possibility of destruction of laboratories must be taken into account and other laboratories in the area must be ready to take over. Involved procedures or special equipment beyond local resources will be made available from regional or national laboratories as part of the total defense program.

Regional and national laboratories will be prepared to receive material for study and identification, and to send trained people to conduct local investigations or consult with local authorities.

Civil defense problems require an intensification of research in:

1. Simpler treatments for burns, in terms of applications to the burned areas.

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*Director of Microbiological Institutes of NIH. This report, "The Role of the Pathologist in Civil Defense," was presented at the College of American Pathologists in Chicago, Oct. 16, 1950.

2. Supportive treatment of persons with burns or shock, particularly from the standpoint of requiring less whole blood.

3. Better methods for preservation of cellular elements of blood.

4. Specific treatments for diseases caused by the smaller viruses.

5. Air sampling devices capable of detecting more agents than present equipment permits.

6. Methods for rapid isolation and identification of pathogenic agents, either from air and water, or from pathological materials.

7. Possibilities of mass immunization by methods less cumbersome than injection of each individual. Example: introduction of an immunizing agent into the air circulating system of a large auditorium, thereby immunizing a great many people at once, painlessly.

8. Speeding up the immunizing process, so that active immunization could be accomplished after exposure (as in rabies treatment).

9. Immunization against whole classes of pathogens, rather than individual species.

10. Sterilization of large masses of air.

11. Oiling measures to control dusts and prevent secondary dissemination of biological warfare agents from contaminated objects.

12. Estimation of infection rates following exposure to agents that might be used in biological warfare.

13. Timing of treatment in relation to completion of incubation period, in order to achieve maximum effectiveness from specific therapeutic agents, for example, antibiotics, which might be in short supply.

14. Development of less cumbersome methods for many of our common laboratory operations, for example, counting of blood cells, determination of blood sugar.

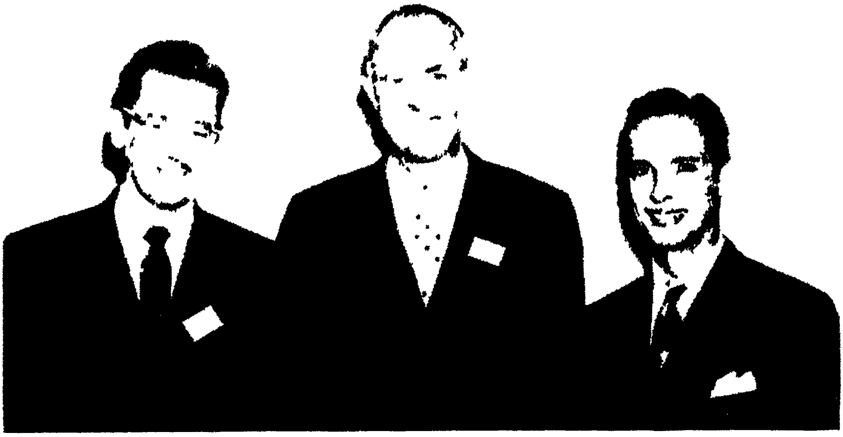
Planning, organization, and training for civil defense should not interfere with normal services as such interference would defeat its purpose. Civil defense will be a stand-by organization in peace. Periodic discussions, refresher courses, and drill exercises will be necessary to keep up efficiency.

Local initiative is imperative in developing civil defense programs, although Federal assistance will be available, for while civil defense is national in scope, it is essentially a local operation.

Association Action Highlights

Asked for relief in military camp and defense project areas with special consideration for problems, such as environmental sanitation, arising out of these defense efforts; recommended high priority for water supply, sewerage and milk processing equipment, and related sanitation facilities, in event of Federal controls; urged immediate issuance of health and medical services manual to implement mutual assistance among the States; urged an interchange of plans and progress reports among State directors of health, National Security Resources Board, and Public Health Service; urged study of decentralization of new hospital facilities, in view of atomic warfare, by State construction authorities; recommended that directors of essential health programs be considered essential until replacements are found and hoped that essential public health service staffs will not be depleted to the point that minimum services cannot be carried on; urged active role by States in investigations of air pollution with guidance as to possibility of State compacts such as in the case of water pollution.

Association's New Officers . . .



New Association officers are Dr. Roy L. Cleere, president, (center), Dr. John D. Porterfield, secretary-treasurer (left), and Dr. Leroy E. Burney, vice president (right).

Dr. Roy L. Cleere, Denver, the new president of the Association of State and Territorial Health Officers has been Executive Director of the Colorado State Department of Public Health since 1936. Active in the Association for many years, he has previously held terms as vice president and as a member of its executive committee. Dr. Cleere was born in Madisonville, Tex., in 1905. He received his medical degree from the University of Texas in 1929, and served his internship in the Kansas City, Mo., General Hospital and the Presbyterian Hospital in Denver. He entered private practice in 1931. In 1935, he received a master of public health degree from the Johns Hopkins School of Public Health.

Dr. Leroy E. Burney, the new vice president, was formerly secretary-treasurer of the Association. He has been Health Commissioner in Indiana since 1945. Born in Burney, Ind., in 1906, he received his medical degree from the Indiana University School of Medicine in 1930. He interned in the U. S. Marine Hospital in Chicago. He received his master of public health degree from the Johns Hopkins School of Public Health in 1932. Dr. Burney served as a commissioned officer in the Public Health Service for 15 years.

Dr. John D. Porterfield, the new secretary-treasurer, is Director of Health for the State of Ohio. Born in Chicago in 1912, he received his medical degree from Rush Medical College in 1938 and interned at the U. S. Marine Hospital in San Francisco. He received graduate training in public health at Johns Hopkins University in 1944. He served as a commissioned officer of the Public Health Service until 1947. During World War II he was assigned to venereal disease work in the Caribbean Theater of Operations.

Personnel Adjustment

Point IV and Doctor Draft

The Point IV program fits well with our American ideals, Surgeon General Leonard A. Scheele said. Point IV is a bold people's proposal to demonstrate their belief in democracy and its better way of life to the farthest outposts of the world. And by democracy we mean the assurance of freedom and social progress, including health progress, through the will and action of the people themselves.

The goal of the health program under Point IV and of similar programs of the World Health Organization is to teach the people how to apply modern health knowledge to their own problems in their own countries and communities.

300 for Overseas

We need 300 American public health workers to carry this knowledge to the Far East and Africa, South America, and the Middle East—300 public health workers with a belief in the worth of human beings whatever their creed or race, economic status or politics, with a sense of destiny, with the spirit of pioneers and missionaries. For it is on these qualities, as well as on professional skills, that the world depends in its struggle for peace and social progress.

Those who would isolate the world from us and who say, "We have so much to do at home, how can we help others when our own job isn't finished?" forget that to follow that line is the very thing the Communists would like. It is the philosophy that would isolate us to ultimate extinction.

I ask you to re-examine your present staffs with a view to yielding up a few key people so that our country can meet its foremost obligation to world democracy. This will mean that for a limited time all of us will have to substitute less fully trained and experienced people for a few of the highly skilled assistants on whom we have come to rely. It will mean, also, the delegation of broader responsibility to some of our present staffs.

The future dividends from such temporary inconveniences will be substantial. We will have learned how to train rapidly the auxiliary workers we have so long needed. Our staffs, both those who go overseas and those who stay at home, will gain valuable experiences and fresh viewpoints. Most important, public health will have done its part in winning a world for peace.

The Public Health Service is spreading its staff still thinner in order to do its part for the world health program. We have sent dozens of our folks to far-away places on ECA, Point IV, and other international health projects, and we plan to send more. But our Nation expects all its health agencies to bear a fair share of the burden.

Represented in Mobilization

Although the mobilization of reserve units, and reserve officers, as well as the operation of the "doctor draft" and the Selective Service program, is going to have some impact on the Nation's health services, many factors are operating to cushion the shock.

The Public Health Service has good liaison with the health and medical services of the Department of Defense. Dr. Richard L. Meiling, Director of Medical Services, Department of Defense, and the Surgeons General of the Army, Navy, and Air Force run big organizations, but they realize that their programs can break down without adequate civilian health services. The integrated program of the Defense Department is going to help.

The Selective Service System and the National Security Resources Board are the key agencies in the mobilization. The Public Health Service has close liaison with these agencies also. We have been working with Dr. Kiefer's Office of Health Resources and have a representative on the Advisory Committee to the Chairman of the NSRB, under the leadership of Dr. Howard A. Rusk.

The members of the Rusk Committee serve also as the advisory committee to the Selective Service System on the operation of the so-called doctor draft. In that capacity, the Rusk Committee also has the responsibility for coordinating the work of State and local advisory committees to Selective Service. There has been established in each State a committee to advise specifically on the doctor draft. These State committees are headed by a physician and usually include the State health officer and a dentist.

Protect Community Services

The invitation to all State health officers to represent the public health interests in their jurisdictions demonstrates that the Federal Government looks to your agencies as the focal point for the protection of community health services.

The objective is to have the Department of Defense, the Public Health Service, and the Selective Service boards accept the advice of these committees both on the induction of qualified registrants and on the call-up of reserves. The various elements of the mobilization must be kept clear or we can become confused and may fail both to support our country in its call to military duty and to utilize the mechanisms set up to protect essential civilian services.

The whole concept of a "reserve" is to provide the Nation with an emergency supply of trained personnel for instant call to duty.

Nevertheless, persons who are really irreplaceable in their civilian jobs, especially those in isolated communities, can be deferred from activation of their reserve status by working directly with the State director of Selective Service, local draft boards, and State and local advisory committees on the doctor draft.

Deferment of Essential Registrants

If the doctor draft begins rapidly to supply the needs of the Department of Defense for physicians, dentists, and veterinarians, it should permit a more orderly withdrawal of personnel, instead of a precipitate call-up of reserves. If the State committees take the initiative, review the situation, and define critical areas and essential positions in their jurisdiction, Selective Service boards and the military services will respect the committees' recommendations on deferment of essential reservists and registrants.

There must, of course, be some uniform criteria for determining essentiality if the doctor draft and the commissioning and calling-up of volunteer reserves are to function fairly. The machinery has just begun to operate. Patience is needed.

The law setting up the doctor draft covers physicians, dentists, veterinarians, and, other allied specialties. At the present time it is being applied only to the three specific categories. It may be extended to other categories not yet specified.

Induction of Health Workers

The public health profession realizes that all health services depend on a much wider range of specially trained people than physicians, dentists, and veterinarians. At the present time, such essential men as engineers, research scientists, biostatisticians, public health teachers, sanitarians, hospital administrators, psychologists, technicians, and key administrative officers are vulnerable to induction through Selective Service. Nurses, nutritionists, health educators, and other groups predominantly composed of women also must be taken into account in the event that the present doctor draft is extended to become a health draft.

The American Public Health Association has a new Committee on Public Health in the Defense Program, under the chairmanship of Dr. Harry S. Mustard, on which Dr. Palmer Dearing, Deputy Surgeon General, will serve as consultant with Dr. Harald Graning as alternate.

This committee can interpret the broad interests of public health to the Selective Service System and to the National Security Resources Board. The committee will also be a point of liaison under the leadership of our major public health professional society for some of the professions not elsewhere represented, for the schools of public health, and the Association of State and Territorial Health Officers.

Undoubtedly, the Nation's health agencies will encounter emergency situations in the expansion of military establishments and defense industries. The Public Health Service has taken this into account and is working on plans that should make it possible to give material assistance to the States in critical defense areas. Our first obligation is the maintenance at all times of a public health force adequate for the protection of the Nation.

All Registrants May Serve

All doctors now registered under the draft will serve in the armed services according to Col. R. H. Eanes, Medical Director of Selective Service. "All" means *all* unless—the present policy of the Government should change or (1) some doctors registered who were not required to register; (2) some failed to come up to physical and mental standards; (3) some few are exempt on hardship grounds or community needs. Last minute voluntary enlistments may not save inductive-eligible physicians from a taste of recruit life.

A drafted doctor must go into the service as a recruit explained Dr. Howard A. Rusk, Medical Adviser to the Chairman of the National Security Resources Board. A recruit cannot be used as a doctor—he may be assigned ward-boy service or sent to basic training. However quickly the process of commissioning officers is speeded up, drafted doctors who wait until they receive their notices to report for physical examinations may not escape serving for a time as a recruit.

Current Problems

Ewing . . . Better Use of Manpower

The job of the hour, according to Oscar R. Ewing, Federal Security Administrator, is the conservation of the national resource in shortest supply—manpower.

We cannot hope to compete with our potential enemies in the size of our population, but we can, through health programs, assure maximum use of the manpower we do have.

Civil defense preparations are important, but we cannot afford to neglect other public health programs which are equally important to the successful survival of this Nation.

Let's Face It

We need not wait, however, for additional resources; we can at once make better use of the not inconsiderable resources at hand. In any peacetime operation, whether Federal Government, State government, or private industry, there's a certain amount of slack. Let's do something about it. Ingenuity, imagination, brains, and hard work will go a long way toward overcoming deficits in funds and personnel.

The aged, the handicapped, the untrained, and the volunteers can do tasks that are now being done by professional persons and experts. But we need creative leadership, planning, and organization to utilize them effectively.

Sample Projects

The Public Health Service through its nurse utilization studies, for example, has helped hospitals get more value from their limited supply of highly trained nurses by delegating the back-rubbing, temperature-taking tasks to less skilled technicians.

When the dental program of fluoride demonstrations was launched, dentists might have been used for this work; instead, the pattern of having dental hygienists make the topical applications was encouraged.

The new diabetes patient education program is another example of smart planning to save professional time. With the educational kit, worked out by public health personnel in cooperation with the American Dietetic Association and the American Diabetes Association, one health educator can give effective instruction to groups of patients, saving hundreds of hours of time that would otherwise have to be spent by physicians in individual consultations.

The campaign for self-examination for breast cancer, on which the

National Cancer Institute and the American Cancer Society have worked cooperatively, is another new time and labor saving project.

These are only a few of many recent developments, Mr. Ewing continued. They indicate a healthy trend and one which has by no means been exploited to the full. Further innovations should result from the resourcefulness which our staff members on WHO teams and in the Point IV programs must develop. A young Public Health Service physician in India, for example, operated a traveling VD clinic in stables and tents. He conducted prevalence studies and case-finding programs without the aid of any well-equipped laboratories. Naturally, we don't advocate return to such primitive conditions, but this training in doing a big job without modern supplies and equipment will be increasingly valuable as our jobs grow bigger and our resources smaller.

Much more could be done to help the aged and the handicapped. At a conference on aging in Washington this past summer, it was stimulating to see this group of experts and ordinary citizens tackling the problem together, and it was amazing how much they found to do without special funds, or personnel, or legislation, or equipment. Dr. Donald Covalt took the same approach in a recent speech to regional medical directors. After he had presented several paraplegic patients who had been restored to usefulness, a medical officer pointed out that most small, local hospitals had no special equipment or trained personnel for helping such patients. The world-famous specialist in physical medicine replied that rehabilitation could be done in a bare room—if the patient and his doctor had sufficient desire and determination.

Citizen Participation

A somewhat different, but equally essential, type of labor conservation program is the more effective use of citizen groups. The Mid-Century White House Conference on Children and Youth can do much to revitalize the active participation of citizens in the affairs of their schools, health and welfare services, and youth groups—activity that has declined considerably since the days of pioneer villages. Literally tens of thousands of people have contributed to the detailed study of health resources in their communities. Their work aroused pride in what they have and determination to get what they still need—and more local health units are high on that list of needs. The conference can and should lead to action programs, planned and manned by citizens' groups in every community in this Nation. People are willing to give their time to improving health; the work they have already done on the White House Conference proves that. It's up to public health personnel to capitalize on that willingness—to take advantage of this vast source of needed manpower.

Back to Useful Work

Public Law 734 makes possible in all States a medical care program for indigents. It can help finance services which will get people out of public institutions and onto productive jobs. It can support improved health services for dependent children. How much it actually accomplishes, however, will depend upon the competencies in each State. The opportunity can be lost and much of the money allowed to dwindle away, or it can be used to assure approved medical care for the more than 4½ million needy aged, blind, and disabled, and for the dependent children covered by public assistance. Welfare agencies will depend on the medical and public health experience of State health department officials to guide this program.

We in the Federal Security Agency will constantly seek, through Public Health Service research and control activities, for mass techniques that provide better public health services with less money and personnel. And, as in the past, we will cooperate with State and Territorial health departments on demonstrations and institutes which will spread this new knowledge quickly throughout the Nation.

Scheele . . . Getting More for the Dollar

Appropriation reductions and budgetary adjustments make it necessary for us to get the most out of every dollar expended for public health. Careful appraisals of our current organizations and operations are especially important. During the past year, several management surveys of health agencies have shown that some obsolete routine activities are absorbing disproportionate amounts of money and numbers of personnel, while important new programs languish for lack of adequate funds and staff. Perhaps one of the best ways to solve these problems would be to review our older programs with the objective of using fewer highly trained personnel in activities that can function reasonably well without the high-powered staff needed in the developmental phases.

The possible reductions in our public health "standard of living," however, does not mean fewer responsibilities. We can expect more demands for the services which the Nation's public health agencies are uniquely equipped to give. The appointment of State health officers as members of the State advisory committees to the Selective Service System represents one of these additional responsibilities and affords a splendid opportunity to the health department to advise on the induction of public health personnel, Dr. Scheele said.

There are also additional responsibilities and opportunities under the new amendments to the Social Security Act which authorize the provision of medical services to the several categories of public assistance clients. The Public Health Service has been asked by the Social Security Administration to set up proper relationships and see that the medical care program is worked down properly through health service lines.

If the State health departments do not become the agencies to plan and develop effective medical services for this new program, another nonmedical agency may be set up for the job which is really theirs.

Teamwork at High Level

If a broad school health program is put into operation, the Office of Education will ask the Public Health Service and the Children's Bureau to help at the Federal level. State and local health departments also should play a greater part in the development of such programs.

New or proposed programs illustrate the advances in our interagency teamwork at the Federal level. The Water Pollution Control Program, the National Conference on Aging held in August, and the Mid-Century White House Conference on Children and Youth illustrate the teamwork approach. By working together in harmony we find that broad new programs for the public can be strengthened and improved by a joint approach with specialized services operated through the technical agency best qualified to do so.

Public Demands New Programs

All that I have been saying adds up to this: The public will not be satisfied merely with more communicable disease control through traditional methods. The demand is for services to mothers and children, industrial workers, the chronically ill, the aged, and the disabled. The demand is that the programs be vigorously administered in the interests of the people for whom they were established.

If the health agencies are not responsive to the public demand, the people will turn to other agencies—to their schools, their welfare or labor departments, or to some new agency created to meet the demand. This can only end in overlapping and waste and in deterioration of services, both in quantity and quality.

Another administrative development that concerns all of us is the new emphasis on "management controls." The trend is in the direction of more such controls in the States as well as in the Federal Government. I believe all of us should get on top of that trend. Demonstrate our abilities—not only as good health technicians, but also as good administrators.

It is possible, however, that the Public Health Service and other grant-administering agencies will have to develop somewhat more clearly defined standards, to keep the growing, ever-more-complex task of administration from running off the track. The special problems of the State health agency perhaps would be better understood and more sympathetically dealt with if the administrative officers and economics advisors on the governor's staff were kept informed of the philosophy, policy, and procedures of our Federal-State cooperative health programs.

Habel . . . Train Technician Aides

There will be a critical shortage of pathology laboratory technicians, according to Dr. Karl Habel, NIH. This can be partially countered by making it possible for the trained professional technician to cover a wider area. Lay persons can be trained as laboratory technicians' aides and do such things as: clean and sterilize glassware and instruments; label specimens, fill out record forms; feed animals, clean cages, check out sick or dead animals, prepare animals for autopsy, and perform some autopsies on animals; perform simpler tests such as blood cell counts, urinalyses, and make simple inoculations.

Part of the auxiliary staff will be technicians not in clinical pathology whose skills are convertible to such work. Technicians in research laboratories and certain commercial laboratories, and high school and college teachers of chemistry and biology could function in this capacity.

Association Action Highlights

Urged support for convening the Fifth World Health Conference (1952) in the United States; urged Council of State Governments to permit a qualified official, serving in the field of public health, to be a member of its technical advisory board; requested that States consider the need for study of industrial health hazards and recommended that health medical care programs be placed in the health and medical care agencies in the States; approved, where communities could meet standards of State health authorities and where medical and dental professions concur, the artificial fluoridation of water supplies for the partial control of dental caries; urged that a national sanitation testing laboratory be developed by the National Sanitation Foundation and official and voluntary health agencies; requested that a representative of the Association be selected as a member of the Council of Public Health Consultants of the National Sanitation Foundation; that the Conference of Sanitary Engineers consider the problem of water supply and sewerage in fringe and subdivision areas; suggested development of code for food processing and storage establishments similar to codes for eating and drinking establishments; recommended formulation of standards for sterilization of garbage used as feed for domestic animals; recommended studies by State health officers of garbage disposal problems and of the supply and distribution of chlorine and other chemicals for public health sanitation uses.

Presentation of Gavel

Dr. Wilton L. Halverson, retiring president (left) presents honorary gavel to Dr. R. H. Hutcheson, president of the Association in 1949.

The traditional presentation of the gavel of the Association of State and Territorial Health Officers was made by the retiring president, Dr. Wilton L. Halverson, California Director of Public Health, to Dr. R. H. Hutcheson, the 1949 president.

Before going to medical school, Dr. Hutcheson studied engineering and managed and operated a large plantation in Lauderdale County, Tenn. He became a physician after a report recommending public health services for his county was rejected by county officials.

Dr. Hutcheson entered the School of Medicine of the University of Tennessee in 1926 and was graduated with distinction in 1930. He became State Health Commissioner in 1943. He resides in Franklin, Tenn.

Dr. Wilton L. Halverson will serve on the executive committee, in addition to Dr. R. H. Hutcheson, Dr. N. H. Dyer, Director of Health for West Virginia, and Dr. Vlado A. Getting, Commissioner of Health for Massachusetts.

Scientific Developments

Biological Warfare

An enemy can attack us with infectious agents or biological toxins which are stable, resistant to heat and drying and to sunlight, capable of quantity production, and suitable for dissemination in the air, water, and milk, said Dr. Karl Habel, Chief of the Laboratory of Infectious Diseases, Microbiological Institute, National Institutes of Health.*

Any bacteriologist can think of a number of agents which could be used to attack us, Dr. Habel stated. Influenza and psittacosis viruses, rickettsiae causing Q fever or typhus, typhoid and cholera bacteria, such fungi as *Histoplasma* and *Coccidioides*, and toxins, such as that produced by *Clostridium botulinum*, are examples of what an enemy might use for sabotage or as a part of an attack with bombs

Possibilities of sabotage can be minimized by alertness and vigilance of laboratory directors and scrutiny of any excessive or unusual demands upon bacteriological supplies or equipment.

Civil defense health services must set up a system of air sampling and accumulate records of normal bacteriological populations of the air in target areas and strategic buildings and installations, under a variety of conditions. At present, apparatus and methods are inadequate for detection of most agents that might be used to attack us, and even organisms caught by the samplers would be identified too slowly. But a start could be made, and improvements effected.

Present methods of testing water and milk would need to be extended to give more specific information than is currently provided. The criteria used now would not have significance in biological warfare

The first intimation of an attack with biological warfare agents will come some days after the attack and will depend upon the appearance of illnesses resulting from exposure. The pathologist will be concerned in three ways:

1. He must be alert to recognize suspicious material coming to him as part of his professional practice, and report such developments promptly to the civil defense health authorities.

2. He will take part in the combined clinical, epidemiological, and laboratory investigations that will start when an attack is suspected.

3. He may take part in formulating and putting into effect measures for control of the situation.

We can anticipate that the effect of biological warfare attacks will be that of a number of primary casualties resulting from a mass initial exposure, and that secondary cases will be absent or minimized. It is not felt that large-scale, self-perpetuating epidemics would develop as a result of attack.

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*See footnote page 1502.

Target area for biological warfare should designate laboratories as detection centers, with the following responsibilities:

1. Supervise collection and analysis of bacteriological material from air samplers, and testing of water and milk supplies.
2. Isolate and specifically identify pathogenic agents suspected of originating from biological warfare attacks. This would include material from patients—alive or dead—and other material collected during the course of detailed investigation.
3. Serve as base of operations for teams or groups assembled for investigations of outbreaks of disease suspected of being due to biological warfare.

Radiation Protection

Because overdoses of radiation can produce burns, severe anemia, sterility, cancer, bone necrosis, and other serious conditions, the usual hospital techniques of radiation protection against X-ray must be modified and extended in the handling of radioisotopes.

Dr. Clinton Powell, Chairman of the Radiation Safety Committee of the National Institutes of Health, said that as more and more hospitals begin to use radioisotopes, either for therapy or research, the problems of protecting patients, physicians, scientists, nurses, and maintenance workers will become more widespread.

The general public, too, will be concerned with the adequacy of this protection. For example, the possible danger of radioactive waste in the public sewage systems will have to be handled at the source—in the hospital. The effects of even moderate overexposure may not be seen for several years. It is then too late, and, since we have no specific treatment for radiation injury, we must emphasize prevention.

While it has been customary to think of lead shielding as satisfactory protection when dealing with diagnostic X-ray machines, handling radioisotopes involves additional considerations. We shall now have to think of protection not only in terms of emergency construction but in terms of regular daily supervision and checking by monitors trained in these specialties.

In the isotope laboratory of the National Institutes of Health, a regular corps of these monitors, working on regular shifts, are constantly measuring worker and laboratory contamination with instruments extremely sensitive to radioactivity. Each worker carries a small pocket ionization chamber, which is read and recorded daily, and a badge that carries undeveloped photographic film, which is developed once a week. Other instruments are installed in appropriate places for measuring contamination of workers' hands, feet, and clothing. These workers are periodically checked as well by health examination.

The disposal of radiation waste, especially, must be planned carefully. In the isotope laboratory, all air is filtered, low energy sewage is released into carefully monitored tanks, and materials with a long radioactive half-life are dumped at sea in caskets by Coast Guard cutter.

Such principles of protection will also have to be made by the hospitals, Dr. Powell said. In addition, the treatment of patients by radioactive isotopes will involve other problems in protection. Where it is practicable to do so, general hospitals should build special radiation wings—as is now being done by the Clinical Center at the National Institutes of Health.

The radiation wing of the Clinical Center will provide for the isolation of radiation patients, and this isolation will be complete. Ordinary hospital items such as dishes, clothing, sheets, and instruments will be kept separate from items usually issued centrally, and these items, too, will be monitored regularly. General hospitals can follow these procedures now.

Mass Casualties

Catastrophes in peace and war come suddenly. Civilian hospitals must make detailed plans now for handling mass casualties. In general, such planning must be based on keeping the normal pattern of hospital organization intact while providing for its expansion.

Planning must encompass hundreds of details, a panel of Public Health Service experts declared. The panel included Dr. John Cronin, Chief, Division of Hospital Facilities; Dr. John McGibony, Chief, Division of Medical and Hospital Resources; and Dr Jack Masur, Director of the Clinical Center, National Institutes of Health.

A typical detail to be considered is the possible necessity for establishing a common system of indicating the type of treatment needed or treatment already given to mass casualties. Besides tagging the patient, symbols may be drawn on a patient's forehead with a red skin pencil—as U for urgent, H for internal hemorrhage, M¼ for ¼ gram of morphine given.

The plans made by the 25 Marine Hospitals of the Hospital Division of the Public Health Service, based on the study of such disasters as the Texas City explosion and the Coconut Grove fire, may well be a model for catastrophe planning in all hospitals in the United States and Canada.

The main problems to be met are simply finding space for patients, and finding people to take care of patients. But both of these problems include an incredible number of step-by-step procedures plus the training of voluntary workers. Planning will have to specify definitely not only the special disaster teams, and special ambulance and first-aid units, but also those responsible for calling the appropriate clergy and for caring for personal belongings of casualties.

The types of injuries most to be expected will be shock (from injury, fright, or exposure), burns, multiple contusions and lacerations, blast injuries (thoracic and abdominal), brain and spinal-cord injuries.

The preparation for emergency supplies, the panel revealed, must include not only reserve supplies in the hospital but information on local sources of additional supplies which would be easily available. Such supplies must be specified exactly (two of this and three of that) depending on hospital space. And not only must definite amounts of drugs, bandages, and tourniquets be set aside, but such items as safety matches, flashlights, paper cups, and bars of soap.

On the basis of previous catastrophe experience, hospitals must also consider such contingencies as relatives and reporters inquiring about casualties—problems which will require proper routing procedures for visitors, a special information center, and emergency broadening of telephone facilities.

Planning alone, the panel emphasized, will not be sufficient. Like any good fire-alarm system, all these procedures must be test-practiced again and again with an actual emergency organization.

Penicillin Dosage Schedule

After treatment by penicillin, there is a varying period when the surviving but damaged infectious organisms fail to multiply and are killed by the action of the body's defenses. Contrary to widespread medical belief, the body's defenses are slight, and most infectious organisms recover from the toxic effects of the drug and resume the process of multiplication.

From the point of view of dosage schedule for penicillin, Dr. Harry Eagle, Chief of the Section on Experimental Therapeutics, National Institutes of Health, stated this has considerable significance. It means that in treatment with penicillin medical men should attempt to minimize those penicillin-free periods when bacteria might recover and remultiply. While "discontinuous" treatment, as practiced, is successful, a schedule with long, penicillin-free periods is likely to be considerably slower in effecting cure than one which provides a continuously maintained level of dosage.

On the basis of his own experiments, Dr. Eagle said, the factor of duration of treatment was more important than the factor of concentration. Massive doses of penicillin, with concentrations several hundred times greater than a concentration normally necessary to kill an organism, did not further accelerate the rate of penicillin action.

In some cases, provision of adequate concentrations of penicillin at the actual focus of infection, for what should have been a sufficiently long period of time, does not always effect cure. In subacute bacterial endocarditis, for example, and also in the early stages of syphilitic infection, large doses over a period of weeks may fail to kill the infection. Some of these failures, Dr. Eagle thought, might be related to the fact that bacteria are susceptible to the lethal action of penicillin in an environment conducive to growth and multiplication. In short, where the infecting organism is multiplying slowly for lack of nourishment, the drug, paradoxically, may become correspondingly inactive.

New Heart Measuring Device

A recently developed instrument to measure the mechanical activity of the heart indicates the possibility that in the near future at least two major heart ailments may be detected earlier than is now possible.

Dr. Bert R. Boone, Chief of the Technical Development Section of the National Heart Institute, described the progress made to date on the device called the electrokymograph.

Investigators working with the new instrument at Temple University Medical School, Philadelphia; Mount Sinai Hospital, New York; the U. S. Marine Hospital, Baltimore; and other research centers throughout the country are hopeful that it will provide physicians with a more accurate and earlier means for detecting coronary thrombosis and constrictive pericarditis.

Coronary thrombosis occurs when a blood clot closes off important circulation nourishing the heart muscle. Early detection and prompt medical attention for cases which escape routine electrocardiographic examination would help prevent many serious complications.

Constrictive pericarditis is a hardening of the sac the heart rests in, restricting its pumping activity. Early operation can relieve the condition.

The electrokymograph consists of a unit containing a sensitive photoelectron tube added to an electrocardiograph and fluoroscope. The photoelectron "eye" measures the dynamic action of the heart muscle by means of X-rays which pass through the patient and throw a silhouette of his heart on a fluoroscopic screen. The pulsations of the silhouette are relayed to an electrocardiograph which records them permanently on a bromide film called an electrokymogram.

Unlike the fluoroscope, which permits no permanent record, or the electrocardiograph, which measures only the electrical impulses of the heart, the electrokymograph supplies a running account of the mechanical activity of the heart muscle.

Specific wave patterns for the two heart ailments are beginning to emerge from the records of thousands of individuals, both with and without heart disease, collected and analysed by the various research investigators.

Additional scientific data points to the possible use of the electrokymograph as a harmless tool to measure rapidly the blood output of the heart. Present methods are hazardous and time consuming. Since most heart conditions affect heart output, a simple, accurate check would enable physicians to detect some conditions earlier than is now possible.

The electrokymograph was first developed in 1946 at Temple University by Public Health Service research investigators, working in cooperation with university scientists.

Association Action Highlights

Urged that State and local health departments take cognizance of recognized facilities and the needs of nonrecognized facilities before formulating heart disease control programs and that these programs be not limited to case-finding activities but include training of laboratory technicians to perform reliable pro-thrombin determinations and to enable more extensive use of anticoagulant therapy in cardiac disorders as well as promotion of rehabilitation measures by appropriate agencies.

Mental Health Survey

Where do people go for help when they have mental or emotional difficulties? Some new light was thrown on this question by a public opinion poll recently made in Phoenix, Ariz.

A report on the survey, made by the University of Michigan Survey and Research Center, was given by Dr. John A. Clausen, Social Scientist, National Institute of Mental Health.

The survey indicates that the establishment of community services is not enough, Dr. Clausen said. Even when badly needed, these services may not be used. Resistances arise not only from ignorance of what skilled professional services can do, but, perhaps, even more from prevailing misconceptions as to the nature and causes of mental and emotional problems.

Only for serious psychiatric disorders would a large proportion of those interviewed go to a psychiatrist, the survey indicated. Only one-third would be willing to visit a psychiatrist although a considerably larger proportion apparently recognized that a psychiatrist would be the appropriate person to consult for what they described as "mental problems" or "nervous disorders."

For advice on marital, child behavior, and other problems, people are more likely to consult clergymen than family doctors or psychiatrists. If faced with difficulties in sexual adjustment in marriage, advice would probably be sought from a clergyman rather than a physician.

The survey was made to study public readiness to use professional aid in dealing with mental problems and factors which affect these attitudes. Interviews were conducted with 500 adults, selected at random from households in five areas of Phoenix and representing almost the entire socioeconomic range of the city's population.

Interviewers asked these 500 people for views and attitudes about three imaginary cases representing relatively minor mental health problems. One was the problem of "Mrs. Jones," an extremely nervous housewife who feared a breakdown. Another was the case of "Mr. and Mrs. Smith," a nice young couple who weren't able to get along together any more. The third involved "Johnny," a 10-year-old boy whose parents had just discovered that he had been stealing for some time.

About one-quarter of the people questioned on the problem of "nervousness" attributed it largely to lack of will power or to behavior a person could control if he wanted to. Approximately one-third believed that nervousness was due to a person's nature, either inherited or conditioned by early training. Another third traced nervousness to such specific situations as economic worries, the fast pace of modern life, disappointments, or shocks.

Those who connected nervousness to lack of will power or the nature of the individual also generally believed that the afflicted person would have to rely upon self help. However, the group who believed the problem to be rooted in situations or experiences of the individual, thought that aid should be sought from a psychiatrist or other professional source. Although one-third said that they themselves would readily seek such help, very few believed that others would do so.

The survey was undertaken as part of the program by the Phoenix Mental Health Center, a demonstration project of the NIMH. Established in 1948 and staffed with both clinical and research personnel, the center operates a mental health clinic, a community mental health education service, and a research project.

The survey is part of the center's research on what people know and do not know about mental health, and what they do about mental and emotional problems. It is generally recognized that people with serious mental illness need psychiatric care. The center, however, is primarily concerned with preventive measures and early treatment of mental disorders. For this reason, it is important to know for what kinds of problems people will seek outside assistance and to what sources of aid they will turn—clergymen, family doctors, nurses, teachers, social workers, or members of other professions. As more is known about these behavior patterns, mental health programs will be able to do more to help the members of these professions deal constructively with the problems people bring them.

Less than half of the population surveyed knew that Phoenix has services to help children with emotional or behavior difficulties. Knowledge of these services was most common among the people with the highest income but with the fewest children. Less than one-third of those interviewed knew that the city has services or agencies to help deal with marriage problems.

Association Action Highlights

Urged that mental health during emergencies be the responsibility of State civil defense councils; asked for continued support and promotion of the film program launched by the National Mental Health Board; recommended the integration of mental hygiene into State programs such as public health, public schools, and general hospitals.

Synthetic Cortisone and ACTH

That cortisone will eventually be available in large quantities as a result of synthesis from inexpensive plant sources was the conclusion of Dr. Erich Mosettig at the seminar on ACTH and cortisone.

Members of the seminar were Dr. Norman Topping, Associate Director of the National Institutes of Health, who acted as moderator; Dr. Evelyn Anderson, Chief of the Section on Endocrinology, and Dr. Erich Mosettig, Chief of the Section on Chemotherapy of the Experimental Biology and Medicine Institute; Dr. Luther Terry, Chief of the Section on General Medicine and Experimental Therapeutics, National Heart Institute; Ernest Allen, Assistant Chief of the Division of Research Grants and Fellowships; and Dr. E. E. Nelson, Director of the Division of Medicine, Food and Drug Administration.

The chemical synthesis of ACTH and cortisone, said Dr. Mosettig, might be made from such plants as yams, yuccas, or even possibly the soybean—plants which can be grown inexpensively and extensively in southwestern United States. While the price of ACTH and cortisone has now gone down to $32 an ounce, as Dr. Nelson pointed out, steroid treatment over a long period of time, as now seems necessary, is still extremely expensive.

Dr. Evelyn Anderson warned that while there were many preliminary successes for ACTH and cortisone, medical men must be alert for important side effects observed in animal experimentation. Dr. Terry specified these side effects in human beings (depression, euphoria, virilism in women) and listed those diseases where ACTH and cortisone treatment was most effective. In particular, Dr. Terry felt that the treatment of rheumatic fever has been greatly improved by the introduction of cortisone.

Association Action Highlights

Urged the incorporation of diabetes screening in multiphasic programs and cooperation with medical societies in recognizing Diabetes Control Week, November 12 to 18; urged promotion of a diabetes control educational campaign directed toward patient use of the PHS-developed educational kit and training courses for professional personnel; urged State health departments to effect studies in determining environmental substances which may be responsible for apparent increase in cancer, urged State and local health departments to take appropriate action to protect public from potential danger from untrained personnel operating fluoroscopic shoe-fitting machines, urged pilot studies to determine role of public health workers in rehabilitation programs for chronically ill; urged State health departments to further activities in nutrition programs in relation to human health; recommended State health agencies encourage improvement of diets of general population and of individuals receiving care in State institutions.

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Dr. R. H. Hutcheson (2d from right) holds the honorary gavel which he received for his services as 1919 president of the Association. With him are three of the four men who received the McCormick award. Left to right are Dr. A. J. Chesley, Dr. Walter L. Bierring, and Dr. Stanley H. Osborn. The award was presented in absentia to Dr. Felix J. Underwood.

A special award for meritorious service in the field of public health was granted for the first time by the Association.

The recipients of this award, honoring the name of the former State Health Commissioner for Kentucky, were:

Dr. Walter L. Bierring, Iowa State Health Commissioner and a former president of the American Medical Association.

Dr. A. J. Chesley, secretary and executive officer of the Minnesota Department of Health and a former president of the Conference of State and Provincial Health Authorities of North America.

Dr. Stanley H. Osborn, Connecticut Commissioner of Health and a former president of the Conference of State and Provincial Health Authorities of North America.

Dr. Felix J. Underwood, secretary and executive officer of the Mississippi State Board of Health and a former president of the American Public Health Association. He is vice chairman of the American Board of Preventive Medicine and Public Health.

Health and the Child

Lenroot . . . Specialized Services Needed

Children present public health workers with a bigger challenge today than ever before, Katharine F. Lenroot, Chief of the Children's Bureau, told the health officers. There are 10 percent more children under 20, and 50 percent more children under 5 years of age, than when the Federal Government started its grant-in-aid programs for child health services in 1935.

We are richer in children than ever before in our history, and we have more knowledge, skills, and resources than we ever had before. We have demonstrated, over these 15 years, what tremendous gains we can make in saving the lives of mothers, infants, and older children when we apply our knowledge and money and organization to this purpose.

How can we make life more worth living for the youngsters we keep alive and especially for those who have physical and emotional handicaps is the question that faces all health workers. This is a tougher job than that of reducing maternal and childhood mortality. It calls for highly specialized services for children with special problems: children with cerebral palsy, rheumatic fever, epilepsy, with hearing and sight defects, and especially children with twisted and unhappy feelings.

Daily . . . New Health Tools for Children

If the full amount of Federal funds authorized by the 1950 amendments to the Social Security Act are appropriated next year, Dr. Edwin F. Daily, Director of Health Services, Children's Bureau, predicts $47,250,000 will be available in 1952 from Federal and State matching funds to help finance public health programs for mothers and children. Such funds can mean a great deal in the lives of many children.

We have new and valuable tools we must put to work for as many needful children as we can reach: the sulfa drugs, penicillin, and other antibiotics; the use of blood and blood derivatives; perfection of pertussis vaccine; fluorides for prevention of dental caries; the electroencephalograph for more accurate diagnosis of epilepsy and new drugs for its control; amazing improvements in the care of premature infants; new knowledge of the importance of proper nutrition in pregnancy and childhood; and successfully operating community programs for the detection, diagnosis, and treatment of hearing loss in children.

Equally essential is the sensitizing of all public health workers to the importance of emotional attitudes in mothers and children. These play a vital part in determining the course of illness, or pregnancy, or the effectiveness of treatment. Health workers must also understand the social, economic, and environmental factors affecting the whole family for success in improving the health of an individual member.

"The humanizing" of hospital care for both mothers and children is a recent trend intimately related to the growing understanding of their emotional needs. Care is taken that clinic patients are not pushed about like sheep, that their hospital admission is a pleasant experience, and that the child is comforted by the friendly concern of doctors and nurses. Another wholesome trend is the gradual disappearance of the closely-packed nursery with its isolation of mother and child, and the substitution of rooming-in arrangements where mothers can have their babies close by. A few communities are learning that many children with long-term illnesses can be cared for in their own homes, with home services by all professional personnel needed, and at far less cost than hospital care.

Glasser . . . Mid-Century Conference

When the Mid-Century White House Conference on Children and Youth opens its doors on December 3 for 4 days of serious work, its 5,000 delegates, each personally invited by President Truman, will be prepared to contribute their ideas on the crucial question posed by the conference:

How can we develop in children the mental, emotional, and spiritual qualities essential to individual happiness and to responsible citizenship, and what physical, economic, and social conditions are deemed necessary to this development?

Never before, said Melvin A. Glasser, Executive Director of the Conference, has there been such mustering of citizen interest in achieving a better childhood for the children of the Nation. No fewer than 100,000 citizens have contributed in one way or another to preparation for this conference. The Governors of all the States and Territories have designated official White House Conference committees. Similar citizen committees have been organized in 1,000 counties. Over 150 national organizations with action programs in behalf of children, more than 100 specialists and research students, and all the committees are submitting reports for conference consideration.

A new way of looking at children's needs is arising—not just counting the children who lack decent homes, medical care, etc., but looking to see what damage is done to a child's personality when these are lacking. The doctors, nurses, teachers, and others who are most successful with children are the ones who take into account the feelings of the children they are serving.

Hard-of-Hearing Children

More than 1,000,000 children in the United States have hearing losses needing medical attention. Yet, only a small proportion get the well-rounded care new scientific developments have to offer such as: audiometer testing, prevention through the use of the sulfonamides and antibiotics, medical and surgical treatment, adjustment to the hearing loss through the use of hearing aids, and auditory and speech training.

Many children are erroneously judged to be totally deaf—a rare condition in children and too frequently placed in special institutions, when actually many can be helped by new developments and lead reasonably normal lives at home.

Two authorities on hearing and speech problems of children discussed with the health officers the ways of providing services to help these children: Dr. William G. Hardy, Director of the Speech and Hearing Clinic at Johns Hopkins Hospital; and Dr. John E. Bordley, Associate Professor of Laryngology and Otology at Johns Hopkins University School of Medicine.

Some of the points they made include:

Public education. This should emphasize the frequency of hearing impairment in the community and promote general understanding of actual hearing mechanisms. Rapport between personnel in education and health fields is essential to the success of any program.

Case finding. A recent Nation-wide survey showed that only 11 percent of school age children have had hearing tests. A case-finding program begun when the child enters school is too late. The profound and many lesser hearing handicaps in childhood usually occur prior to school age. Nevertheless, a case-finding program among preschool children is rare, even though there has been a recent trend to provide formal education for preschoolers with hearing difficulties. The screening program in preschool children is dependent largely upon the services of many community agencies since a mass screening technique is not readily applicable, although testing in individual cases is reliable even at 1 to 2 years of age. For every preschool child known to have severe hearing loss there are probably 20 with milder degrees labeled mental retardation or behavior problem.

Complete pediatric appraisal. The diagnostic examination is better done under the aegis of a pediatrician. When the child cannot communicate properly other difficulties follow.

Adequate medical and surgical treatment. Some 15,000,000 adults in the United States have auditory difficulties. About 50 percent of the impairments started in childhood and could have been reversed if treated soon enough. There may be a loss of only 15 to 18 decibels in two or more frequencies in each ear with no acute otological symptoms. Referrals of such children may be helpful as a baseline; if further loss occurs something should be done. The child with a loss of 25 to 30 decibels is probably headed for trouble, even though this degree of hearing loss is only borderline in the adult. Hearing impairment may be of a mixed type. There may be Eustachian tube obstruction in addition to a degree of nerve deafness. In such instances, treatment of the reversible portion is even more important in order to relieve the effects of the conductive lesions.

Audiologic study and consultation. Audiology is the science of hearing. The audiologist may be a research man or a clinician. Services must include a complete appraisal of the physical and the behavior mechanisms concerned with hearing. When hearing aids are provided training must go along with them so that they may be used to best advantage. Speech reading (this term is replacing lip reading) is essential. Psychotherapy should be provided as needed.

Special education. Special services should be provided as needed in the school the child would ordinarily attend. Institutional care of children with hearing disabilities is being reappraised at the present time. The average cost of such care is $1,500 a year per child. Once placed, few children are removed during the school years.

Association Action Highlights

Endorsed World Health Organization report on definition of live birth and fetal death and urged States to change their definitions accordingly as rapidly as possible; urged State and local health departments to study current investigations of fetal deaths and initiate further studies of the causes and prevention of fetal deaths; recommended that State health departments cooperate with State welfare and education and other agencies in developing standards for care of children in institutions; that a study be made and recommendations listed concerning development of home care programs for children with long-term illnesses and for maternity patients discharged early from hospitals.

Incidence of Disease

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

Reports From States for Week Ended October 28, 1950

New cases of acute poliomyelitis reported in the United States during the current week numbered 1,316, a 15 percent decrease from the 1,549 (corrected) cases reported for the preceding week. This is the fifth consecutive week that a decrease from the preceding week has been reported. The figure for this week is higher than the corresponding number (1,071) for 1949.

The cumulative total (26,698) for the current "disease" year was below the corresponding total (37,218) for last year, the highest on record. The "disease" year for acute poliomyelitis begins with the twelfth week of the calendar year. The cumulative total for the calendar year was 27,830, compared with the total of 38,131 for the corresponding period last year.

For the current week, reported cases of poliomyelitis in 8 of the total of 9 geographic divisions decreased from the preceding week. These decreases ranged from 69 (347 to 278) cases reported in the

Comparative Data For Cases of Specified Reportable Diseases: United States

[Numbers after diseases are International List numbers, 1948 revision]

Disease	Total for week ended		5-year median 1945-49	Seasonal low week	Cumulative total since seasonal low week –		5-year median 1944-45 through 1948-49	Cumulative total for calendar year—		5-year median 1945-49
	Oct. 28, 1950	Oct. 29, 1949			1949-50	1948-49		1950	1949	
Anthrax (062)	1	2	(1)	(1)	(1)	(1)	(1)	40	41	(1)
Diphtheria (055)	150	251	359	27th	1,706	2,418	3,181	4,834	6,216	9,478
Acute infectious encephalitis (082)	32	16	11	(1)	(1)	(1)	(1)	816	663	543
Influenza (480-483)	1,118	1,158	1,576	30th	11,370	10,815	11,795	260,629	86,682	154,148
Measles (085)	1,201	637	1,190	35th	5,805	4,443	5,767	293,976	592,961	560,009
Meningococcal meningitis (057.0)	69	66	66	37th	367	325	325	3,166	2,841	2,932
Pneumonia (490-493)	1,011	1,183		(1)	(1)	(1)	(1)	68,752	64,938	-----
Acute poliomyelitis (080)	1,316	1,071	715	11th	[2] 26,698	37,218	21,910	[2] 27,830	38,131	22,377
Rocky Mountain spotted fever (104)	1	2	1	(1)	(1)	(1)	(1)	445	549	535
Scarlet fever (050)	961	907	1,195	32d	5,315	5,580	7,039	45,485	63,246	68,953
Smallpox (084)	--	---	-	35th	1	3	5	27	44	152
Tularemia (059)	14	11	11	(1)	(1)	(1)	(1)	767	960	807
Typhoid and paratyphoid fever (040, 041)[3]	83	72	73	11th	[2] 2,471	2,950	2,950	[2] 2,980	3,438	3,438
Whooping cough (056)	1,543	1,415	1,620	39th	5,909	5,593	6,183	103,104	52,195	82,058

---

[1] Not computed.

[2] Deductions: Poliomyelitis—Michigan, week ended Oct. 21, 2 cases; typhoid fever—North Carolina, week ended July 1, 1 case.

[3] Including cases reported as salmonellosis.

Middle Atlantic States to 3 (127 to 124) in the Pacific States. An increase of 13 cases (419 to 432) occurred in the East North Central States.

For the current week, the States reporting the largest numbers of cases were New York (180), Michigan (127), Illinois (110), Ohio (101), California (77), and Wisconsin (67).

Alaska reported 4 cases compared with 5 last week. The cumulative total for the calendar year was 49. Hawaii reported 1 case for the week.

Reported cases of scarlet fever for the current week numbered 961, the highest total for any week since the week ended June 3 when 1,015 cases were reported. These figures may be compared with the corresponding week in 1949 when 907 cases were reported and the 5-year (1945–49) median for the current week which was 1,195. The trend in reported cases of scarlet fever, by geographic division for the past four weeks, with the cumulative calendar total, was as follows:

Area	Weeks ended—				
	Sept 30	Oct 7	Oct 14	Oct 21	Oct 28
New England	45	50	41	48	67
Middle Atlantic	70	69	90	102	130
East North Central	87	143	154	185	228
West North Central	19	16	24	21	52
South Atlantic	96	122	133	145	175
East South Central	70	83	93	108	126
West South Central	27	29	29	54	53
Mountain	11	9	12	19	17
Pacific	49	65	83	96	113
Total	474	586	659	778	961
Cumulative calendar total	42,501	43,087	43,746	44,524	45,485

Deaths During Week Ended Oct. 28, 1950

	Week ended Oct. 28, 1950	*Corresponding week, 1949*
Data for 94 large cities of the United States:		
Total deaths	8,848	9,068
Median for 3 prior years	9,068	
Total deaths, first 43 weeks of year	393,740	393,581
Deaths under 1 year of age	645	625
Median for 3 prior years	635	
Deaths under 1 year of age, first 43 weeks of year	26,674	28,120
Data from industrial insurance companies:		
Policies in force	69,607,123	70,087,000
Number of death claims	13,605	13,740
Death claims per 1,000 policies in force, annual rate	10.2	10.2
Death claims per 1,000 policies, first 43 weeks of year, annual rate	9.2	9.2

Reported Cases of Selected Communicable Diseases: United States, Week Ended Oct. 28, 1950

[Numbers under diseases are International List numbers, 1948 revision]

Area	Diphtheria (055)	Encephalitis, infectious (082)	Influenza (480-483)	Measles (085)	Meningitis, meningococcal (057.0)	Pneumonia (490-493)	Poliomyelitis (080)
United States	150	32	1 448	1 201	69	1 011	1 316
New England		1	4	39	5	57	45
Maine				4	1	7	3
New Hampshire			3			1	2
Vermont							1
Massachusetts		1		25	3		23
Rhode Island				5			
Connecticut			1	5	1	49	16
Middle Atlantic	6	2	6	258	16	300	278
New York	3	1	[1] 1	78	8	104	180
New Jersey	2	1	5	73	3	37	47
Pennsylvania	1			107	5	159	51
East North Central	15	5	28	276	14	106	432
Ohio	5		2	46	5		101
Indiana	3	2	5	8		11	27
Illinois	3	1	2	53	5	50	110
Michigan	4	2		42	2	41	127
Wisconsin			19	127	2	4	67
West North Central	4	3	1	56	6	35	133
Minnesota	2			4		10	23
Iowa	1	1		5		1	56
Missouri	1			31	2	7	16
North Dakota				7		7	
South Dakota		1					3
Nebraska							12
Kansas		1	1	9	4	10	23
South Atlantic	44	1	287	114	5	88	144
Delaware				7	1		1
Maryland				1	2	10	31
District of Columbia				3		15	6
Virginia	2		216	38		34	36
West Virginia	7		49	37		4	7
North Carolina	14			2			28
South Carolina	10		4		1	10	11
Georgia	11	1	18	25		5	14
Florida				1	1	10	10
East South Central	38		35	48	9	77	47
Kentucky	7		3	29	2	34	14
Tennessee	15		16	12	4		12
Alabama	12		15	3	2	27	3
Mississippi	1		1	4	1	16	18
West South Central	32		1 015	90	4	257	89
Arkansas	3		108	6	1	31	8
Louisiana	2					8	18
Oklahoma	1		71	10	1	11	8
Texas	[illegible]		833	74	2	207	55
Mountain	6	2	60	122	5	46	24
Montana	2		7	1			3
Idaho			3	17		3	4
Wyoming				2	2	2	
Colorado	3		5	71	2	11	9
New Mexico				2		10	1
Arizona	1	2	45	6		19	4
Utah				20	1	1	3
Nevada							
Pacific	5	18	12	198	5	45	124
Washington				37		1	21
Oregon	1		5	8	1	8	26
California	4	18	7	153	4	36	77
Alaska			1			2	4
Hawaii			88	7		2	1

[1] New York City only.

Anthrax: Pennsylvania 1 case.

Reported Cases of Selected Communicable Diseases: United States, Week Ended Oct. 28, 1950—Continued

[Numbers under diseases are International List numbers, 1948 revision]

Area	Rocky Mountain spotted fever (104)	Scarlet fever (050)	Small-pox (084)	Tularemia (059)	Typhoid and paratyphoid fever [1] (040, 041)	Whooping cough (056)	Rabies in animals
United States	1	961		14	83	1,543	111
New England		67			4	226	
Maine		9			1	54	
New Hampshire		1				4	
Vermont		2				62	
Massachusetts		49			2	60	
Rhode Island						16	
Connecticut		6			1	30	
Middle Atlantic	1	130			17	312	23
New York	1	[2] 58			8	108	23
New Jersey		23			1	134	
Pennsylvania		49			8	70	
East North Central		228		1	9	314	17
Ohio		96		1	3	58	4
Indiana		15			2	32	8
Illinois		29			2	35	
Michigan		63			2	92	5
Wisconsin		25				97	
West North Central		52		2	5	137	5
Minnesota		11				8	2
Iowa		8				46	3
Missouri		11		2	3	18	
North Dakota		1				11	
South Dakota							
Nebraska		9				15	
Kansas		12			2	39	
South Atlantic		175		1	14	142	14
Delaware		4			1	2	
Maryland		11			1	24	
District of Columbia		7				1	
Virginia		27			3	21	
West Virginia		10				28	1
North Carolina		77		1	1	41	
South Carolina		10				2	8
Georgia		22			7	12	4
Florida		7			1	11	1
East South Central		126		2	8	71	22
Kentucky		31			1	11	9
Tennessee		70			3	30	6
Alabama		17		1	2	24	5
Mississippi		8		1	2	6	2
West South Central		53		2	15	174	28
Arkansas		3			6	15	3
Louisiana		1			1		
Oklahoma		14			1	8	2
Texas		35		2	7	151	23
Mountain		17		5	2	88	
Montana		4				7	
Idaho		2			1	6	
Wyoming				2		5	
Colorado		6			1	17	
New Mexico						9	
Arizona		1				32	
Utah		4		3		12	
Nevada							
Pacific		113		1	9	79	2
Washington		48			2	25	
Oregon		7		1		6	
California		58			7	48	2
Alaska							
Hawaii		3					

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[1] Including cases reported as salmonellosis.
[2] Including cases reported as streptococcal sore throat.

FOREIGN REPORTS

CANADA

Reported Cases of Certain Diseases—Weeks Ended Oct. 7 and 14, 1950

Week Ended Oct. 7, 1950

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Brucellosis	-	-	-	-	2	-	-	-	-	-	2
Chickenpox	3	-	10	-	45	86	18	35	47	53	297
Diphtheria	-	-	-	-	10	1	1	-	-	-	12
Dysentery, bacillary	-	-	-	-	6	11	1	-	-	2	20
Encephalitis, infectious	-	-	-	-	-	-	-	2	-	-	2
German measles	1	-	6	-	2	35	-	3	9	17	73
Influenza	-	-	46	-	-	1	5	-	-	-	52
Measles	-	-	9	-	196	142	16	7	17	35	422
Meningitis, meningococcal	-	-	-	-	-	1	-	1	-	-	2
Mumps	-	-	6	-	49	58	12	49	33	31	238
Poliomyelitis	-	-	-	1	-	8	-	6	6	3	24
Scarlet fever	3	-	2	-	34	17	10	11	27	4	108
Tuberculosis (all forms)	4	-	8	10	135	35	23	5	-	-	220
Typhoid and paratyphoid fever	-	-	-	1	13	-	-	1	1	3	19
Venereal diseases:											
Gonorrhea	6	-	11	10	79	55	32	21	53	67	334
Syphilis (total)	5	-	8	3	64	21	3	2	12	10	128
Primary	-	-	2	-	6	-	1	2	1	-	12
Secondary	-	-	1	-	5	-	-	-	-	1	7
Other	5	-	5	3	53	21	2	-	11	9	109
Whooping cough	1	-	4	8	29	62	7	3	3	36	153

Week Ended Oct. 14, 1950

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Brucellosis	-	-	-	-	6	-	-	1	1	-	8
Chickenpox	-	-	15	3	172	197	20	37	45	73	562
Diphtheria	1	-	-	-	2	2	1	-	-	-	6
Dysentery, bacillary	-	-	-	-	7	5	6	-	-	3	21
German measles	-	-	3	1	3	41	-	6	2	14	70
Influenza	-		17	-	-	2	-	-	-	-	19
Measles	1	-	10	-	87	164	28	11	2	86	389
Meningitis, meningococcal	1	-	-	-	1	3	-	-	-	1	6
Mumps	-	-	1	1	78	85	11	23	59	35	293
Poliomyelitis			-	-	-	5	-	2	2	2	11
Scarlet fever	3	-	1		63	31	10	8	23	18	157
Tuberculosis (all forms)	9	-	10	24	86	14	21	9	22	70	265
Typhoid and paratyphoid fever	1	-	-	1	10	3	-	-	1	-	16
Venereal diseases:											
Gonorrhea	7	-	9	6	77	43	35	23	45	62	307
Syphilis (total)	2	-	5	2	50	20	2	7	7	9	104
Primary	-	-	2	-	4	6	-	4	3	2	21
Secondary	-	-	-	1	1	1	-	-	1	-	4
Other	2	-	3	1	45	13	2	3	3	7	79
Whooping cough	2	-	2	2	111	122	9	5	2	21	276

MADAGASCAR

Reported Cases of Certain Diseases and Deaths—August 1950

Disease	Aliens		Natives	
	Cases	Deaths	Cases	Deaths
Bilharziasis			22	
Diphtheria	5		7	
Dysentery:				
Amebic	4		97	1
Bacillary	1		88	11
Erysipelas			4	
Influenza	171	6	9, 134	89
Leprosy			48	
Malaria	200	8	29, 318	114
Measles	2		54	
Meningitis, meningococcal	1		4	1
Mumps			66	
Paratyphoid fever	1			
Plague			4	3
Pneumonia (all forms)	32		1, 388	167
Puerperal infection			3	1
Tuberculosis, respiratory	2	1	80	16
Typhoid fever	1		5	1
Whooping cough	8	1	201	4

NORWAY

Reported Cases of Certain Diseases—August 1950

Disease	Cases	Disease	Cases
Brucellosis	2	Paratyphoid fever	1
Diphtheria	6	Pneumonia (all forms)	1, 380
Dysentery, unspecified	5	Poliomyelitis	117
Encephalitis, infectious	1	Rheumatic fever	71
Erysipelas	362	Scabies	605
Gastroenteritis	4, 055	Scarlet fever	91
Hepatitis, infectious	115	Tuberculosis (all forms)	264
Impetigo contagiosa	1, 903	Typhoid fever	4
Influenza	2, 152	Venereal diseases:	
Malaria	2	Gonorrhea	228
Measles	290	Syphilis	50
Meningitis, meningococcal	10	Other forms	4
Mumps	60	Whooping cough	1, 826

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

Burma. During the week ended September 23, 1950, one fatal case of cholera was reported in the port of Kyaukpyu.

India. For the week ended October 21, 1950, 110 cases of cholera were reported in Madras.

India (French). Eight cases of cholera were reported in Karikal, French India, during the week ended September 30, 1950. During the week ended October 7, 4 cases were reported in Karikal, and 4 cases in Pondicherry.

Plague

Belgian Congo. During the period October 7–19, 1950, one fatal case of pneumonic plague was reported in Stanleyville Province at Djaiba, north of Blukwa. On October 19 one fatal case of septicemic plague was reported at Blukwa.

Burma. During the week ended September 9, 1950, one fatal case of plague, imported, was reported in the port of Pegu.

China. Plague has been reported in Fukien Province as follows: June 1–30, 1950, 168 cases, 56 deaths; July 1–31, 74 cases, 36 deaths. In Kwangtung Province, 103 cases, with 17 deaths were reported during the month of June, and 5 cases, 1 death, were reported in Suichi District during the period July 1–10.

Madagascar. During the period October 1–10, 1950, 8 cases of plague, with 7 deaths, were reported in Madagascar, of which 7 cases, 6 deaths, occurred in Majunga Province.

Smallpox

Angola. Thirty-two cases of smallpox were reported in Angola during the month of May 1950, and 94 cases during the month of June.

Cameroon (French). Twenty-two cases of smallpox, with 5 deaths, were reported in French Cameroon during the period October 1–10, 1950.

Dahomey. For the period October 11–20, 1950, 42 cases of smallpox were reported in Dahomey.

Peru. Smallpox has been reported in Peru as follows: June 1–30, 1950, 379 cases; July 1–31, 245 cases.

Typhus Fever

Germany (United States Zone). During the week ended September 30, 1950, one case of typhus fever was reported in Hesse.

Peru. During the month of June 1950, 115 cases of typhus fever were reported and during the month of July, 151 cases were reported.

Yellow Fever

Gold Coast. Yellow fever was reported in Accra, Gold Coast, as follows: October 9–12, 1950, one fatal suspected case; on October 11, one suspected case.

Venezuela. During the period October 6–10, 1950, two deaths from jungle yellow fever were reported in Bolivar State. Health authorities stated both these deaths occurred in jungle areas, one of them 124 miles from the other. Exact localities were not given.

Plague Infection in the Hamakua District, Hawaii

A letter dated October 25, 1950, from Hawaii states that plague infection was proved in a mass inoculation of tissue from two rats, *R. norvegicus*, trapped October 11, 1950, in district 5A, Honokaa Area, Hamakua District, Island of Hawaii.

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The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

The Public Health Reports, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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FEDERAL SECURITY AGENCY
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Public Health Reports

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Control of Norway Rats With Residual Rodenticide Warfarin

By Wayland J. Hayes, Jr., and Thomas B. Gaines*

The discovery by Dr. Karl Paul Link and his associates (*1, 2*) of the chemical now called warfarin[1] and their recognition of its rodenticidal properties (*3*) provided a completely new practical approach[2] to rodent control. The new material differs from all previously used successful rodenticides in two respects: it kills effectively only when consumed repeatedly and it produces no acquired bait refusal or bait shyness in the rodents being poisoned.

This paper reports several laboratory and field tests aimed at evaluating the usefulness for public health of this new approach to chemical rodent control. The evaluation has not been completed by any means, but one method of using warfarin for the control of Norway rats has been tested and found effective, and the over-all cost of the method has been explored.

All of the tests were done at Savannah, Ga., where the classical studies of murine typhus were conducted by Maxcy many years earlier (*4, 5, 6*). Some of the field tests were done in the very heart of the old typhus focus, and some were done in stores in which the rodenticides, 1080 or ANTU, had recently been used by experienced personnel with only partial success. The control of rats under these conditions is obviously significant for public health.

Materials and Methods

The rats used for laboratory tests were adult male and female albino and wild Norway rats. The wild rats were hand caught from

---

*Surgeon, and biologist, respectively, Technical Development Services (Savannah), Communicable Disease Center, Public Health Service, Atlanta, Ga.

[1] Chemically, the compound is 3-(α-phenyl-β-acetylethyl)-4-hydroxycoumarin or 3-(α-acetonylbenzyl)-4-hydroxycoumarin. Both names have been approved by Chemical Abstracts but the latter is the one currently in use. During its trial period the compound was known as compound 42 or W.A.R.F.-42. It was called "42" because it stood 42d in a table in one of the original publications (*1*). The initials "W.A.R.F." and the first letters of the name, warfarin, stand for the Wisconsin Alumni Research Foundation which owns the patent (No. 2,427,578-9 September 16, 1947).

[2] The approach with Dicumarol was similar but impractical. See discussion in the body of this paper.

garbage dumps and were held for at least 1 week in the laboratory before being placed in tests. During this interval unhealthy or otherwise abnormal rats were discarded. During the test period rats were individually caged in Army Medical School type cages and supplied with an adequate amount of food and water.

The compound for stomach tube tests was suspended in vegetable oil at different concentrations so that the oil could be administered to rats at the rate of 0.005 cc. per gram of body weight.

The dry poisoned baits were prepared by mixing the appropriate amount of warfarin[3] into the bait with an ordinary kitchen-type electric food mixer. In preparing baits containing low poison concentrations, the poison, an amount of cornstarch 100 times the weight of the poison, and, finally, enough meal to make up the total quantity of bait were weighed out separately in advance. The poison and cornstarch were thoroughly mixed. A volume of meal approximately equal to that of the poisoned bait was then added and mixed, and this procedure was continued until all the meal had been used up. Each separate mixing required at least 15 to 20 minutes. Coarse, yellow, germ-free corn meal of a quality suitable for cooking was used as a bait for warfarin in all of the field and some of the laboratory tests. Ground Purina laboratory chow was used as a poisoned bait in other laboratory tests and in all the simulated field tests. The yellow corn meal has proved to be, in this area, the best accepted, readily available, moderately priced bait material. It is also a good semipermanent bait, one with good keeping quality, and one which is not likely to be carried from the bait station uneaten. Whole meal is slightly preferable, but the degerminated meal that can easily be obtained from grocery stores is quite satisfactory.

The poisoned baits were offered in the laboratory to the rats along with a choice of a poison-free bait. Thus, none of the rats were forced to take poison in order to eat. The poisoned and poison-free baits were offered in separate nonspillable food cups which were attached side by side to the rear of the cage floor. The baits were weighed daily or every other day and the consumption of each bait computed.

The poisoned meal was dispensed in the field in small glass bowls of approximately 300 cc. capacity. In places where there was any danger of the meal being picked up by children or knocked about by workmen so that it could contaminate other food, a simple station was used as a protective cover for the poisoned meal (fig. 1). The station was constructed of ¾-inch lumber and ½-inch mesh hardware cloth. A hole 2½ inches by 4 inches at each end of the station served as an opening for rats to enter and leave the station. The station was screwed to the floor or wall. The size opening used was necessary

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[3] The warfarin employed in these studies was supplied through the kindness of the Wisconsin Alumni Research Foundation. It was the pure enolic form and not the 0.5 percent dilution in starch which is currently available.

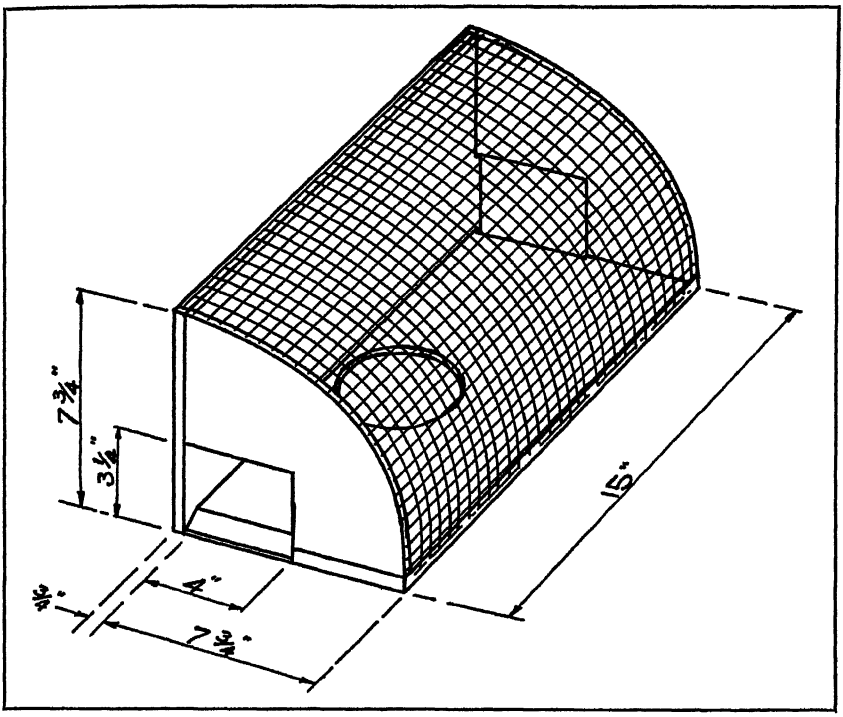

Figure 1. Poison bait station of the type used in field tests with warfarin. The ½-inch hardware cloth was secured to a frame of ¾-inch lumber. The diameter of the hole in the bottom which secured the bait cup in position was 4½ inches

in order to remove the bait dish for cleaning out molded or otherwise contaminated baits. Refilling was done through the hardware cloth without removing the dish.

Simulated field tests with wild Norway rats were conducted in four wooden, barracks-type buildings measuring about 20 by 100 feet which were ratproofed and supplied with ample harborage, consisting of boxes, paper, and other rubbish. Each building was artificially infested with rats (including immature rats in two buildings) at least 6 weeks before the tests were started. Before and during the test period the rats were maintained with liberal supplies of corn meal and wheat shorts as well as water. In the tests, poisoned ground Purina laboratory chow bait was placed in open bowls at eight points in each building in a manner similar to field control methods. At the end of each test, the harborage was removed piece by piece and every living and dead rat accounted for.

In field tests, estimates of the extent of rat infestation before and after poisoning were based on observations of live rats, damage to merchandise, tracking dust tests, and recovery of dead rats. No establishment was considered rat-free until tracking tests revealed an absence of rats for at least a week.

Field tests were conducted in rat-infested business establishments. In some instances a few mice as well as Norway rats were present; there was no evidence of roof rats. The occupants of these places complained of severe rat damage to merchandise. In many cases live rats were seen during the day. The establishments fell into three general groups:

(a) Two complete city blocks in the center of the business district, surrounded by paved streets, and containing stores devoted almost exclusively to food handling. This is one of the classical foci of murine typhus.

(b) Fifteen grocery and other food handling stores located almost entirely in slums.

(c) One stockyard and abattoir, one grocery store, and one airport outside of town and isolated from other foci of rat infestation.

At the time these studies were made it was not considered desirable to use warfarin in homes.

So far as could be observed, or learned from others, ratproofing had never been attempted except in the two city blocks (group a). These had been ratproofed in 1940 almost 10 years before the present study was begun. The work had fallen into such disrepair that no real ratproofing could be said to exist. Block No. 1 consisted of very old, three-story buildings with dirt floor basements chiefly used for storage. Block No. 2 consisted of the City Market Building which, for the purpose of this study, was divided into seven establishments on the basis of the type of business conducted in each particular section. The main floor was treated as one establishment since the floor is generally open except for a large refrigerator at each end. The basement was divided into large sections in such a way that one business place was separated from another by solid brick walls. There were, however, passages which rats could use to get from one section to another, and the concrete floor was imperfect in places so that rats were able to burrow beneath it.

Results

Toxicity of Warfarin to White Rats in Stomach Tube Test

Warfarin was administered by stomach tube to white rats fed *ad libitum* on Purina laboratory chow, a diet sufficient in vitamin K to maintain rats well under normal laboratory or field conditions. It was realized that animals on such a diet would be somewhat less susceptible to the toxic action of warfarin than rats on an inferior diet and that vegetable oil used as a diluent might have further antidotal action. However, the test was designed to compare the effect of warfarin upon rats, when given daily, with its effect upon them when administered every other day for a specific number of doses under conditions of normal diet. The test was also designed to show the degree of mortality which warfarin in various multiple doses will produce.

One series of tests consisted of administering single doses of 3.0, 2.0, 1.0, 0.50, 0.25, and 0.125 mg. of warfarin per kilogram of body weight, daily for 5 consecutive days. Another series of tests consisted of administering the poison to rats in single doses of 5.0, 3.0, 2.0, 1.0, 0.75, and 0.50 mg./kg. every other day until a total of five doses was administered. Tests at critical dosage levels were repeated as a check.

The results of these stomach tube tests, presented in table 1, indicate that, under the conditions of the experiment, warfarin is capable of killing 90 percent or more of rats in 2 to 12 days when given at a total dosage of 5 mg./kg. and it is, at critical dosage levels, slightly less effective when the separate doses are given on alternate days rather than on successive days. A total dosage of 2.5 mg./kg. killed but one of the 10 rats tested although it caused symptoms of intoxication in 7 of them. Undoubtedly, lower concentrations would have killed rats more effectively if the doses had been repeated more than five times.

The results of these stomach tube tests may have been somewhat prejudiced as shown by the pathology of the animals which died (see below). Even so, if a total dosage of 5 mg./kg., to be consumed over

Table 1. *Mortality among 21 groups of 9 or 10 white rats each given stomach tube administrations of warfarin in vegetable oil until death or until a maximum of five doses were given. The rats were maintained on Purina laboratory chow during the test.*

Frequency of administration	Single dose (mg /kg.)	Mortality			Survival time (days)*
		After 3 doses only	After 4 doses or less	After 5 doses or less	
Daily	3.0	2/10	5/10	10/10	3-6
	2.0	1/10	3/10	9/10	3-6
	1.0	0/10	3/10	10/10	4-12
		1/10	5/10	8/10	2-7
	.5	0/10	0/10	7/10	5-8
		0/10	1/10	4/10	4-6
	.25	0/10	0/10	2/10	7
		0/10	1/10	3/10	3-7
	.125	0/9	0/9	0/9	------------
		0/10	0/10	0/10	------------
Every other day	5.0	4/9	8/9	9/9	3-8
	3.0	6/10	9/10	10/10	4-8
		8/10	9/10	9/10	3-7
	2.0	4/10	5/10	9/10	6-10
		4/10	5/10	8/10	3-13
	1.0	3/10	6/10	8/10	5-11
		3/10	3/10	6/10	5-13
	.75	0/10	1/10	1/10	7
		2/10	2/10	4/10	6-13
	.5	0/10	0/10	0/10	------------
		0/10	1/10	**1/10	7

*Includes only rats which died.

**Rat pregnant, extensive hemorrhage in left horn around placenta.

a period of 5 days, be hypothetically considered the minimum requirement for efficient poisoning, then it is clear that a 200 gm. rat would have to eat different quantities of poisoned bait daily depending on the concentration of the poison in the bait. These relationships are shown in table 2. They suggest that concentrations of poison in bait as low as 0.10 or even 0.05 mg./gm. might be effective for field use since it is reasonable to assume that commensal rats might be enticed into taking roughly 11 or even 22 percent of their food in the form of poison bait.

Table 2. *Amount of poisoned bait of different concentrations necessary to provide 1 mg. of poison per kilogram of body weight daily to a 200-gm. rat. The percentage of the total daily food intake is also given based on an average intake of 17.5 gm. of food per 200-gm. rat per day. Actually such rats consume 12 to 20 gm. of dry food per day.*

Concentration of poison in bait	Amount of bait required daily to give 1 mg. of poison	
mg./gm.	gm.	Percent of total food
1.0	0.2	1
.5	.4	2
.25	.8	5
.10	2.0	11
.05	4.0	22

Poisoned Bait Acceptance by Wild Norway Rats in Laboratory Tests

Groups of 10 wild rats each were offered the compound at dosage levels of 1.0, 0.5, 0.3, 0.2, and 0.1 milligrams per gram of bait. The test continued until the death of all rats in each group. Results are shown in table 3. All the rats died within 9 days after feeding started. None died before the third day of feeding and all offered bait at 0.1, 0.2, and 1.0 mg./gm. died within 1 week of testing. It would seem that dosages higher than 0.1 mg./gm. have no advantage. With the exception of the group offered the 0.5 mg./gm. concentration, each group took, on the average, slightly less poisoned bait than poison-free

Table 3. *Mortality among five groups of 9 or 10 wild Norway rats offered warfarin in ground Purina laboratory chow until death. A choice of the same food without poison was also offered.*

Body weight (gm.)		Warfarin in poisoned bait (mg./gm.)	Food consumption per rat (gm.)				Mortality		Survival time (days)
			Poisoned		Poison-free				
Range	Mean		Range	Mean	Range	Mean	First week	Total	
162-258	201	1.0	3.0-27.0	14.8	15.5- 33.0	22.6	9/9	9/9	4-6
150-354	244	.5	17.5-63.0	35.0	2.5-115.0	26.0	8/10	10/10	3-8
223-378	304	.3	4.0-28.0	17.5	26.0- 92.5	47.9	9/10	10/10	5-9
160-446	252	.2	5.5-47.5	20.1	17.0- 59.5	43.2	10/10	10/10	4-7
155-288	205	.1	6.5-26.0	17.6	7.5- 50.5	20.8	10/10	10/10	3-7

food of the same kind; this is inconclusive evidence that wild Norway rats detect warfarin in bait and show a slight primary bait refusal. What is more to the point, the test gave no indication of acquired bait refusal or bait shyness since there was no indication that any of the rats decreased their consumption of poisoned bait more rapidly than their consumption of poison-free food (see table 4). There was, of course, an absolute decrease in the amount of both kinds of food taken as poisoning progressed, but the amount of poison taken was sufficient to cause death.

Table 4. *Bait consumption of wild Norway rats in the face of progressive warfarin poisoning when offered poisoned and poison-free ground Purina chow. The rats are the same as those shown in table 3.*

Warfarin in poisoned bait (mg./gm.)	Day	Food consumption per rat (gm.)				Number rats alive
		Poisoned		Poison-free		
		Range	Mean	Range	Mean	
1.0	1 and 2	3.0–21.0	8.1	3.5–25 0	15.8	10
	3 and 4	0 –12.0	5.1	0 –14.0	7.3	10
	5	0	0	0	0	7
	6	0	0	0	0	1
0.5	1	1.0–20 0	8.3	0 –19.0	2.6	10
	2	7.5–19.5	13.0	0 –18.5	6.1	10
	3	2.5–20.0	9.9	0 –20.0	7.6	10
	4	0 –17.5	5.7	0 –20.0	5 2	10
	5	0 – 5.0	.7	0 –20.0	2.2	10
	6	0	0	2.0–18.5	3.4	6
	7	0	0	0	0	4
	8	0	0	0	0	2
0.3	1 and 2	0 –26.0	11.4	23 0–30.0	24.7	10
	3 and 4	0 –35.0	9.5	0 –41.0	21.6	10
	5 and 6	0	0	0	0	5
	7 and 8	0	0	0 – 6.5	6.5	1
0.2	1 and 2	0 –45.5	10.5	0 –52.0	18.2	10
	3, 4, and 5	0 –38.0	11.3	0 –36.0	15.8	10
	6 and 7	0 – 2.5	6.7	0 – 8.0	2.0	6
0.1	1	2.0–16.0	7.4	0 –15.0	6.7	10
	2	3.0–11.5	6.0	0 – 9.5	5.0	10
	3	0 – 4.0	1.6	0 –12.0	4.2	10
	4	0 – 6.0	2.2	0 –12.0	3.5	9
	5	0 – 4.0	1.0	0 – 3.5	1.1	7
	6	0	0	0	0	4
	7	0	0	0	0	2

Survival of Albino Norway Rats in Relation to Poison Dosage

Dosages of 0.05, 0.025, 0.0125, 0.00625, and 0.003125 of warfarin per gram of bait were tested against groups of 10 white rats each. Each rat was offered poison in corn meal bait and a choice of poison-free ground Purina laboratory chow. A study of table 5 and figure 2 shows that none of the rats survived longer than 2 weeks except those offered dosages of 0.00625 and 0.003125 mg./gm. Poisoning was discontinued in the group receiving 0.00625 mg./gm. of bait at the end of 2 weeks and one animal survived until the 18th day. It showed typical pathology at autopsy. Eight rats died during a 40-day exposure to the 0.003125 mg./gm. dosage. However, one rat succumbing on the 20th day, died of pneumonia, although subcu-

Table 5. *Mortality among white rats fed warfarin-poisoned corn meal at various dosages. Rats were offered a choice of poison-free laboratory chow. Rats in the first four groups were offered poison for 2 weeks or until death; rats in the last group were offered poison for 40 days or until death. The greater bait consumption of the last two groups corresponds to their longer survival.*

Warfarin (mg./gm.)	Weight of rats (gm.)		Total poisoned bait consumed per rat (gm.)		Total warfarin consumed per rat (mg.)		Poison-free bait consumed per rat (gm.)		Mortality	Survival time (days)*	
	Range	Mean	Range	Mean	Range	Mean	Range	Mean		Range	Mean
0.05	203-376	227	39.0- 66.0	57.1	1.95-3.30	2.85	0.0-91.0	23.2	10/10	5-14	7
0.025	205-308	223	44.0- 98.5	65.4	1.10-2.46	1.64	4.5-43.0	16.9	10/10	6-10	7
0.0125	200-376	244	34.0- 89.0	64.9	.43-1.11	.81	2.5-55.0	23.2	10/10	6-13	9
0.00625	183-325	240	59.5-152.0	110.9	.37- .95	.69	5.0-57.0	28.0	10/10	8-18	12
0.003125	240-406	318	94.5-338.5	210.8	.28-1.02	.63	15.0-94.5	51.5	8/10	10-32	21

*Based on rats which died.

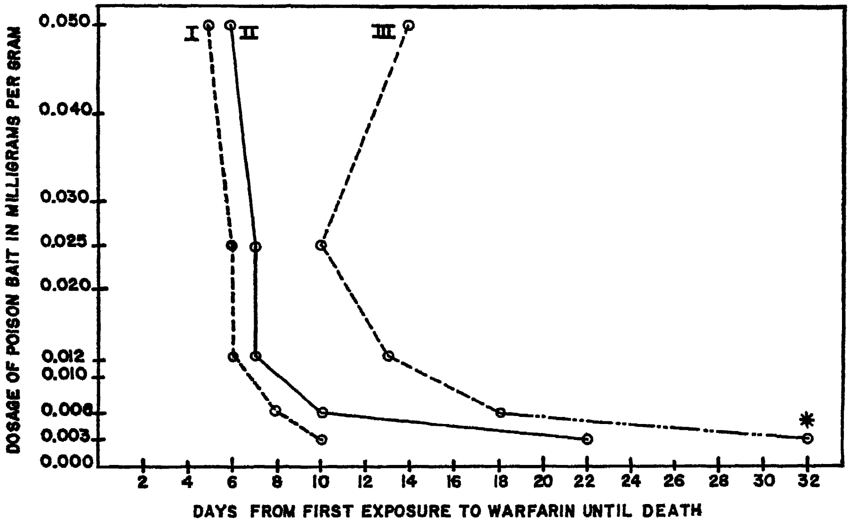

Figure 2. Survival time in days of white rats fed warfarin at various dosage levels in yellow corn meal as well as a choice of poison-free ground Purina laboratory chow. All rats were fed until death or for a maximum of 14 days except those offered poisoned bait at the 0.003125 mg./gm. level where the maximum was extended to 40 days. Curve I represents the survival time of the first, curve II the fifth, and curve III the last rat dying in each group. The point marked with an asterisk is based on the eighth and last animal which died in its group of 10.

taneous hermorrhage was noted in the head. The two remaining rats in this group survived, although at the end of 40 days one showed external signs of poisoning. With a bait concentration of 0.025 mg./gm. or higher, there appeared to be no important difference in the survival time of rats; at lower concentrations the survival time gradually increased (fig. 2). This must be interpreted in the light of the fact that in these tests the acceptance of ground laboratory chow was poor and the acceptance of poisoned corn meal bait correspondingly high. The rats took 71 to 81 percent of their total diet in the form of poisoned bait. Obviously, such a rate of bait consumption could not be expected regularly in the field. One might, then, expect a gradual increase in the survival time of rats in the field if baits containing less than 0.05 mg. of poison per gram of food were used. However, if time were not a factor, it is conceivable that dosages even lower than 0.05 mg./gm. might be effective. Such doses would be somewhat cheaper and present slightly less hazard. The results emphasize that if rats do show a very light primary bait refusal because they detect warfarin (a point which has not been established), then this can be more than compensated by offering the poison in a more acceptable bait.

It is interesting to note that those rats which were offered a concentration of 0.00625 mg./gm. for 14 days all died, having consumed a total of 1.82 to 3.90 mg./kg., an average of only 0.69 mg. of poison per rat or 2.87 mg. of poison per kilogram of body weight.

Simulated Field Tests With Wild Norway Rats

Because rats decompose so rapidly in warm weather, warfarin was exposed to wild rats in barracks-type buildings only for a maximum of 7 days. The results with concentrations of 1.0, 0.1, and 0.05 mg. of warfarin per gram of ground laboratory chow are shown in table 6. Satisfactory kills (85 to 100 percent) were obtained at all the dosages tested. By comparison, similar tests with other poisons produced the following range of mortality: ANTU 50 to 80 percent, thallium sulfate 72 to 94 percent. Three buildings were used in the ANTU tests and 10 buildings were used in the thallium sulfate experiments; these poisons were exposed overnight in the usual manner. Simulated field tests appeared to confirm the indication of laboratory studies that warfarin would be an effective rodenticide against Norway rats under field conditions at a concentration at least as low as 0.05 mg./kg. This was particularly true since the baiting period was too short for optimum results and the ground laboratory chow is not so acceptable as corn meal, the bait used in field studies.

Table 6. *Mortality among wild Norway rats living in a simulated natural habitat and fed on corn meal and wheat shorts when offered warfarin in ground Purina laboratory chow*

Building No.	Amount warfarin in bait (mg./gm.)	Number days bait in building	Number of rats		Percent mortality
			Total	Dead	
1	1.0	6	107	107	100.0
2	1.0	5	61	52	85.2
3	.1	7	25	24	96.0
4	.05	7	19	18	94.7

Field Tests

Actual field tests with warfarin were begun in the summer of 1949 before the complete results of the laboratory and simulated field tests became available. For that reason, tests were started with high concentrations of the poison (1.0 and 0.5 mg./gm.). Later, as evidence accumulated on the potency of the compound, the concentration was lowered to 0.1 and then 0.05 mg./gm.

Ten of the places tested had been poisoned one or more times by a municipal typhus control unit or by pest control operators within the 12-week period preceding tests with warfarin. Sodium fluoroacetate and ANTU had been used in different establishments as shown in table 7.

Table 7. *Recovery of dead rats from establishments poisoned with rodenticides other than warfarin within 12 weeks before poisoning with warfarin*

Poison			Establishment No.	Number of rats recovered
Kind	How used	Shortest time in weeks to nearest week before use of warfarin		
1080	Permanent stations	1	1	8
	Permanent stations	1	4	10
	Permanent stations*	1	9	(1)
	Overnight 2 times**	4	11	100
	Overnight 4 times**	4	13	118
	Overnight once	11	14	10
	Overnight once	11	15	3
	Overnight 5 times**	5	16	156
	Permanent stations*	1	20	(1)
ANTU in solid bait	Exposed for 3 days	3	34	120

*1080 not properly protected.
**Not consecutive nights.
(1) Not known.

Tests were discontinued in establishments 6, 7, and 9. However, wherever possible, warfarin is being maintained in stores and warehouses indefinitely to evaluate it as a residual rodenticide. The results of tests with warfarin extending over a maximum of 284 days are outlined in table 8.

Rat infestation was, in general, controlled within 2 to 3 weeks at all of the dosage levels tested. There was no apparent advantage in the other concentrations over the 0.05 mg./gm. level as regards speed of kill or other factors. In many cases, tracking tests indicated the presence of a few rats for one or more weeks after the occupants had declared that injury to merchandise had stopped. However, the rat populations were gradually brought under control at rates which varied with the difficulty of the local situation. In 4 of the 31 places studied rats were never eliminated at any time. This was probably due in two instances to continual reinfestation from outside; in one instance to baiting problems; and in one instance to poor cooperation on the part of the occupant of the premises and consequent discontinuance of the test. After control was achieved, some of the establishments would

Table 8. *Results of field tests against Norway rats with warfarin in yellow corn meal*

Treatment with warfarin						Establishment		
mg./gm. of bait	Duration days	Number dead recovered			Number bait placements	No.	Type	Remarks
		During		Total				
		First week	First 2 weeks					
0.1†	284	3	13	27	11	*1	Poultry abattoir.	Initial infestation moderate. Failed to achieve control with permanent 1080 bait stations in place 63 days. No further rat damage after 1 month.
	245	15	27	40	6	*2	Grocery store	Initial infestation heavy. Generalized odor detected 2d week. 36 rats recovered 1st month. No rat damage after 2 weeks.
	240	*6+1	*16+2	*19+3	9	*3	Small animal hospital.	Initial infestation moderate. No rat damage after 2 weeks; 19 dead rats recovered during 1st month.
	242	0	7	7	6	*4	Pastry bakery	Initial infestation light. Failed to get control with permanent 1080 bait stations in place 42 days. No rat damage after 3 weeks.
	270	0	*0+2	*0+4	5	*5	Grocery store	Initial infestation light. No rat damage in store or in residence above store after 3 weeks.
	29	*1+3	*2+4	*2+4	6	6	Grocery store	Initial infestation light. No signs of rats or mice after 2 weeks. Bait stations removed on 29th day.
	28	0	*6+2	*6+2	7	7	Airport hangar	Initial infestation moderate. No signs of rats or mice after 2 weeks. Bait stations removed on 28th day.
	204	0	0	*0+1	7	8	Drug store	Initial infestation light. Manager failed to achieve control with other poisons. Infestation eliminated 4 weeks after starting use of warfarin.
	92	0	2	*2+4	5	9	Grocery store	Initial infestation moderate. Exterminator using 1080 failed to achieve control. Damage reduced first 2 weeks with warfarin but never eliminated.
	190	7	8	*13+1	37	11	Poultry abattoir.	Block No. 1.—Initial infestation heavy especially in No. 16. No rat damage after 2 weeks. Tracking test indicated a very light rat infestation still present in establishment 16. See discussion.
		1	*1+1	*1+1	7	12	Wholesale produce.	
		*6+1	*7+1	*8+1	17	13	Peanut roasters.	
		7	14	14	17	14	Wholesale produce.	
		0	0	1	3	15	Furniture store.	
		45	*68+1	*86+1	23	16	Poultry abattoir.	
	181	13	42	70	22	17	Main floor meat and vegetable mkt.	Block No. 2.—Initial infestation heavy. Establishments combined constitute Savannah City Market, which is surrounded on all sides by paved streets. Establishments all rat-free at end of 2 weeks except Nos. 17 and 20 where rats were harboring in refrigerator insulation and feeding on inside. Market rat-free after 1 month except for occasional rat on main floor revealed by tracking tests. See discussion.
		0	*3+2	*3+2	7	18	Poultry abattoir.	
		1	1	1	5	19	Basket and crate storage.	
		1	*3+1	*4+1	18	20	Wholesale meat mkt.	
		27	31	31	19	22	Wholesale produce.	
		0	*0+1	*0+1	5	23	Basket and crate storage.	

See footnotes at end of table.

Table 8. *Results of field tests against Norway rats with warfarin in yellow corn meal.*-Continued.

Treatment with warfarin						Establishment		
mg./gm. of bait	Duration days	Number dead recovered			Number bait placements	No.	Type	Remarks
		During		Total				
		First week	First 2 weeks					
0.05	137	3	10	17	6	25	Grocery store	Initial infestation moderate. Rat damage ceased after 3 weeks. Rat-free after 6 weeks.
	137	1	*7+1	*9+1	10	26	Grocery store	Same as for establishment No. 25.
	137	0	*4+1	*4+1	6	27	Fish market	Initial infestation light. No signs of rats since 2d week.
	134	3	*4+1	*6+1	10	28	Grocery store	Initial infestation moderate. No rat damage after 2d week. Occasional signs of rats revealed by tracking tests.
	150	*0+1	*5+1	*5+2	6	29	Grocery store	Initial infestation light. Signs of only one rat after 2d week. Damage ceased. Rat-free at end of 3 months.
	147	1	*1+?	*1+? 3 mice	7	30	Grocery store	Initial infestation light. Manager saw live rats in store during daylight before use of warfarin. No signs of rats after 2d week. Very few mice. Generalized odor during 2d week.
	141	0	0	0	3	31	Grocery store	Initial infestation light. Rats previously damaging goods severely. No signs of rats after 2 weeks. Generalized odor.
		0	1	1	6	32	Grocery store	
	120	25	113	267	53	34	Stock yards and meat packing plant.	Initial infestation heavy. 120 rats recovered following use of ANTU 3 weeks previously. Rats practically eliminated from stockyards within 1 month after starting use of warfarin. Very few signs of rats around abattoir after 3 months. 146 rats recovered during 1st month. See text.

*Additional dead rats indicated by odor.

†Establishments 1 and 2 treated with 1.0 mg./gm. and establishments 3, 4, and 5 treated with 0.5 mg./gm. dose level up until time blocks 1 and 2 were poisoned.

remain rat-free for a month or longer. When there was reinfestation by rats or mice, they were eliminated before any apparent damage was done to merchandise. That reinfestation was, in fact, the cause of reappearance of rats was indicated in some instances by the fact that occupants of residences near treated establishments reported that their places were gradually disinfested of rats over a much longer period than that necessary for the initial control in the treated store. In other instances, workmen reported seeing rats enter the treated areas from buildings or blocks where no poison had been placed.

Rats were controlled successfully in eight places and unsuccessfully in one additional place where 1080 had previously been used without achieving complete control.

Actually, the kill produced by 1080 had in most cases been satisfactory, but enough rats had been left alive to damage merchandise and, of course, breed back the colony. Under these circumstances warfarin proved useful in reducing the rat population to insignificant numbers during the entire test period and in eliminating damage to merchandise.

Rats were also controlled in a combined abattoir and stockyard (No. 34) where control by ANTU had been tried. One hundred and twenty rats were recovered after the use of ANTU, and 267 more were eventually taken after the use of warfarin. This place presented special difficulties, for there were few locations where protected bait stations could be put. Further, the rats not only occupied the yards and abattoir proper but also lived in various drainage ditches into the banks of which they burrowed. They emerged to feed on the abundant refuse available in the surrounding fields where it was not considered safe to make bait placements.

Special baiting problems were encountered in certain large walk-in refrigerators located in stores Nos. 17 and 20. Rats were harboring in the insulation and had free access to abundant and varied food in the refrigerators. For an entirely unexplained reason, these rats began to take poisoned bait only after it had been in place about 2 weeks. Control was achieved during the following month in spite of imperfect bait acceptance.

Effect of Feeding Warfarin-Poisoned Rats to Cats

A stray cat had made its home in one place where warfarin was to be used at the rate of 0.1 mg./gm. Permission was obtained to poison it. It was not confined or molested in any way, but it died during the first week after apparently eating part of several sick or dead rats. Autopsy revealed the cat was pregnant. Rat skin, hair, and bone were in the stomach, and the pathology of the cat was entirely typical of warfarin poisoning.

A laboratory study was made of the hazard of warfarin to cats. A group of adult Norway rats were fed the compound in corn meal at a dosage of 0.1 mg./gm. until they became sick. Each was fed on the poisoned bait alone for a minimum of three days. The following three tests were conducted using adult cats: First, two cats, both female, were starved for 24 hours and then each was fed a sick live rat. No evidence of injury was ever detected in these cats. Second, a male cat was offered a sick live rat each day for 8 days. The rats offered on the sixth and eighth days were not eaten. The cat died on the eighth day after eating six rats. Autopsy findings revealed that death was due to the effects of warfarin. Third, a female cat was offered two sick live rats each day for 5 days. On the first day, neither rat was eaten; on the second day, one rat was eaten; and on the fourth and fifth days, both were eaten. After consuming a total of five rats, the cat survived apparently unaffected.

Dr. Link (7) has shown that secondary poisoning depends largely on warfarin still contained in the alimentary tract of poisoned rats and not on warfarin in their tissues. This, however, has little bearing on the hazard of secondary poisoning under operating conditions.

Pathology

Warfarin acts by inhibiting the formation of prothrombin and by causing capillary damage. Rats and other animals exhibit pallor and weakness as they become poisoned by it. Subcutaneous hemorrhage and/or swelling due to hematomata may become visible externally especially on the appendages. Oral or rectal bleeding occurs but not in all rats. Appetite remains disproportionately good, although it does decrease. There are no convulsions or other seizures. The appearance of animals and the blood findings suggest that death is caused by shock. Most rats poisoned by warfarin lose weight. Losses up to 23 percent have been observed. Rats which survive more than a week commonly show all or most of their weight loss in the last several days. An occasional rat gains slightly. The two white rats which were fed a concentration of 0.003215 mg./gm. and survived did not lose weight, although one did show pallor of the feet and ears.

Twenty-nine white rats that died after taking poisoned baits in the laboratory and 35 wild rats that were killed in the field were autopsied as well as 61 white rats that died after stomach tube tests. At autopsy, all but 14 of these 125 rats showed one or more lesions characteristic of anticoagulant poisoning and sufficient to account for death.

Those in which pathology was recognized and which died after voluntarily ingesting baits showed either general pallor of all the organs and the musculature, and/or muscular or intramuscular or subcutaneous or intestinal hemorrhage. Less frequent were hemorrhages of the genital organs and retroperitoneal pelvic and lumbar region, and small circumscribed hemorrhages of the lungs. Hemorrhage of the brain was rare, and bleeding into the peritoneal cavity was not observed. Subcutaneous hemorrhage was more frequently observed in wild rats, but whether this was due to the rougher conditions of their lives or was a matter of chance was not clear.

The group of rats that received poison by stomach tube differed in that 23 of the 61 showed hemorrhage in the neck region and/or the mediastinum. This bleeding was clearly periesophageal and usually ended sharply at the point about midway of the chest and beyond which the stomach tube had not passed. There was rarely any extension of the hemorrhage into the chest cavity and in most cases there was no indication that bleeding into the lumen of the esophagus had occurred. Often the loose tissue of the neck or the entire thymus gland was permeated by the blood which, characteristically, was not completely clotted and not organized. In spite of the frequency of this periesophageal lesion there was no clear evidence that rats died faster or more surely because of the procedure. In fact, death was caused by lower dosages when the poison was given by a different method. The experience does emphasize that the hemorrhage tends to start at a point of very minor trauma, for the procedure was done by an experienced operator and by a technique that causes no apparent injury or inconvenience to normal rats which do not receive warfarin.

No greater incidence or speed of poisoning was noted generally for males or females in any of the tests. Pregnant females appeared to be slightly more susceptible than nonpregnant females. No age differential was observed.

Discussion

All of the poisons, new and old, previously available for the control of commensal rats and mice have two characteristics in common: (1) They kill when given in single doses of appropriate strength; (2) they cause, to a greater or lesser extent, an acquired bait refusal (bait shyness) in animals which happen to take a small dose so that they are only sublethally poisoned. This characteristic often makes it impossible to eradicate a colony of rats with poison bait even when several poisons and baits are resorted to in series—a common practice among pest control operators. Many of the poisons previously available also share a third characteristic: they are about equally dangerous to man and domestic animals that happen to take a single dose, as they are dangerous to rats. Unfortunately, the safer of the quick-acting poisons also tend to be the least effective for rat control.

Because of these characteristics, many efforts in the past have been directed toward: (1) discovering more toxic substances of such bland taste that rats would seldom fail to take a lethal dose the first time they encountered the poison, or (2) discovering materials to disguise the taste of the poison or attractants to induce rats to take more bait or to take it more surely, or (3) discovering more effective techniques of prebaiting, or (4) combining emetics with the poison in order to make it less hazardous, especially to man. None of these efforts have been strikingly successful.

Some of these considerations led O'Connor (*8*) to state the requirements for an ideal rat poison. These requirements, somewhat modified, are as follows: (1) The poison must be surely effective when incorporated into baits in such small quantity that its presence is not detected to an interfering degree. (2) Finished baits containing the poison must not excite bait shyness in any way and the necessity of prebaiting must, thereby, be avoided. (3) The manner of death must be such that surviving individuals will not become suspicious of its cause, but will remain on the premises and eat freely of the bait until they themselves die. (4) The poison, in the concentration used for control, must be specific for the species to be destroyed unless its use can be made safe for man and domestic animals by some other means.

O'Connor, in stating his requirements, had in mind Dicumarol,[4] which he studied as a rodenticide.[5] However, the requirements remain and the first three appear to be fulfilled by warfarin. The fourth requirement appears to be better satisfied by warfarin than by the effective single-dose rodenticides presently available. Just what hazard it will present will depend on the dosage at which it is used and the method of its distribution. The present investigation indicates that warfarin may be effectively used under field conditions against Norway rats at a bait concentration of 0.05 mg./gm. (0.005 percent). This concentration is considerably lower than those actually field-tested and reported by other investigators (*10, 11*). Clearly, the hazard is somewhat reduced by the use of lower concentrations. This problem of hazard is discussed below in connection with the cost of operations.

Although rats in this study died in places where they could not be reached and odors were detected, it was not considered that these odors were more frequent or stronger than those expected from the extensive use of any other rodenticide.

The keeping quality of the bait under field conditions appeared to be limited only by the corn meal. Mold in warm, damp weather interferes with the acceptability of such bait, but there was no indication of a loss of toxicity of the poison.

No difficulty whatever was encountered in getting rats to enter bait stations, although they were made of new lumber. In other tests not reported here, there has been difficulty in getting rats to enter bait stations containing baffles so constructed that there was no direct path through the station.

There appears to be no reason why people generally as well as pest control specialists should not learn to use warfarin successfully; but if it is used in the pattern established for the older, quick-acting rodenticides, it obviously would fail.

Bait placements must be serviced frequently during the early period when rats are taking quantities of bait, and later, dead rats must be removed. Even so, the service time does not appear excessive when compared with the results achieved.

The cost of bait was estimated on the basis of the current price of warfarin formulations ($2.15 per pound of 0.5 percent warfarin formulation) and yellow corn meal of cooking grade ($4.05 per 100-pound bag) to be $8.25 per 100 pounds. Bait stations were estimated at $1.30 each, using current costs of labor and new materials. Satisfactory bait cups or bowls may be made by cutting off discarded motor-oil cans at a height of 2 inches. A can manufacturer has estimated the cost of a suitable can at $67.03 per 1,000.

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[4] 3,3-Methylene bis(4-hydroxycoumarin).

[5] O'Connor reported considerable success. However, tests at this laboratory gave so little indication that Dicumarol was an effective rodenticide that the matter was dropped and no report made. Differences in results may have been based on differences in diet. The marked effect of diet and especially of vitamin K on intoxication by Dicumarol has been noted (*9*).

In the two complete (but small) city blocks reported in this paper, 189 bait placements were made of which 138 were in bait stations. A total of 72.2 pounds of finished bait, costing $5.95, was used during the first 3 weeks. (Much smaller quantities were used thereafter.) By contrast, the bait stations cost $127.40. If specially manufactured bait cups had been used, they would have cost $12.66, making a total of $146.01 for the two blocks or an average of $11.23 for each of the 13 establishments. The finished bait for each of these heavily infested places cost $0.46.

In 21 other establishments at various locations within the city, 50 pounds of bait, 125 bait cups, and 95 bait stations were used at a total cost of $127.63 without specially manufactured bait cups. The cost per establishment was $6.08 of which $0.20 went for bait.

From these estimates it is clear that the use of warfarin in corn meal is an economically feasible way of controlling rats if only a few or no bait stations are required. However, if many such stations are required and if they must be bought or made from new materials at the usual wage rates, then the costs mount rapidly. Even so, bait stations are durable equipment, and it might be feasible for those permanently interested in rat control to acquire them. In this introductory study, bait stations were used wherever there was any chance that a domestic animal or a child or other irresponsible person might reach a bait placement. It is possible that safety might have been guaranteed at a much lower cost. That is a matter to be determined after further experience. There is no doubt that warfarin is highly toxic when taken in repeated doses. There also seems little doubt that it presents far less hazard when taken in the largest single dose which could be consumed at the concentration suitable for finished bait.[6]

From the standpoint of cost, as well as in other ways, warfarin appears admirably suited for the control of rats on ships. Here the crew can be informed of the use of the poison, the bait colored, the placements marked "POISON" and few, if any, bait stations used.

Warfarin could also be used economically on farms and around private residences where completely satisfactory bait stations could be improvised from scrap lumber at nominal cost. An 8- or 10-inch board 2 or 3 feet long can form a station if leaned against a wall at about a 45° angle and nailed to the floor and wall to form a tunnel.

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[6] Most rats (all tested so far) resist a single dosage of warfarin at the rate of 50 mg./kg. To obtain this dosage, a 150-pound man would have to eat 3.5 kg. or 7.7 pounds of corn-meal bait containing warfarin at the rate of 0.1 mg./gm.

If it can be used economically, warfarin should prove a valuable weapon for permanent rat control even where ratproofing is not practical. Although DDT has contributed much to the control of typhus fever through its action on rat fleas, it is possible that warfarin properly used in connection with good sanitation may become a most potent weapon for the control of typhus and plague, as well as those rat-borne diseases not transmitted by fleas.

Summary and Conclusions

1. Warfarin provides a completely new workable approach to rodent control. It is not "just another rodenticide," but its exact role will have to be decided by further experience.

2. Because it does not cause acquired bait refusal (bait shyness), the compound is self-prebaiting and may be used as a residual rodenticide.

3. All rats tested withstood a single dose of warfarin at the rate of 50 mg./kg. Ninety percent or more of rats given the compound by stomach tube for 5 consecutive days were killed by a total dosage of 5 mg./kg. or above. Warfarin was slightly less effective when given on alternate days. All of 10 rats offered poisoned bait at a concentration of 0.00625 mg./gm., along with poison-free food, for 14 days were killed; they took an average total of 2.87 mg./kg.

4. Field trials against Norway rats, including some tests in an old focus of murine typhus and in places where 1080 and ANTU had previously been used without complete effectiveness were successful even with concentrations of 0.05 mg./gm. of bait (0.005 percent). Yellow corn meal proved an effective bait.

5. Secondary poisoning may occur if cats (and presumably dogs) eat several warfarin-poisoned rats over a period of days.

6. Warfarin produces a typical pathology that can be recognized with almost complete certainty in something over 85 percent of rats killed by it.

7. The cost and other limiting factors in the use of warfarin are discussed.

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Industrial Sickness Absenteeism

Males and Females, 1949, and Males, First and Second Quarters, 1950

By W. M. Gafafer, D. Sc.*

This report, one of a continuing series, presents data on sickness absenteeism among 225,000 male and female employees during 1949 and earlier years, and among males during the first and second quarters of 1950. Data for the series are derived from periodic reports of industrial sick benefit organizations comprising mutual benefit associations, group health insurance plans, and company relief departments. The data are limited to sickness and nonindustrial injuries causing absence from work for more than 1 week. Quarterly reports covering the experience of male employees in 1949 have appeared (*1*, *2*). The last report for females was for the year 1948 (*1*).

Males and Females, 1949 and Earlier Years

Year, 1949. Table 1 presents frequency rates by cause for male and female workers during 1949 and 1948, and for the 10-year period 1940–49. During the year 1949, all sickness and nonindustrial injuries resulted in annual frequency rates of 95.5 absences per 1,000 males and 254.5 absences per 1,000 females. These numbers are equivalent to an average for the year of one absence of 8 days or longer for every 10 male workers and a corresponding absence for every 4 female workers.

Among males, the 1949 rate is some 9 percent below the corresponding frequency for 1948, and more than 15 percent below the 10-year frequency of 115.7. Among females, on the other hand, the 1948 and 1949 rates are similar in magnitude, both rates being more than 15 percent above the frequency recorded for the 10-year period.

For both males and females, the group of nonrespiratory-nondigestive diseases accounts for more absences in 1949 than any other broad cause group, constituting about 40 percent of the absences for each sex. Among males, the rates for specific causes in this group, and for the group as a whole, appear relatively stable in the three time periods covered. Among females, each of the rates, with one or two minor exceptions, recorded in 1949 for specific nonrespiratory-

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*From Division of Industrial Hygiene, Public Health Service.

Table 1. *Annual number of absences per 1,000 persons on account of sickness and nonindustrial injuries disabling for 8 consecutive calendar days or longer, by cause; experience of male and female employees in various industries, 1949, 1948, and 1940–49, inclusive* [1]

Cause [2]	Annual number of absences per 1,000 persons beginning in specified period					
	Males			Females		
	1949	1940–49 [3]	1948	1949	1940–49 [3]	1948
Sickness and nonindustrial injuries	95.5	115.7	104.5	254.5	218.8	257.2
Percent of female rate	*38*	*53*	*41*	------	------	------
Percent of male rate	------	------	------	*266*	*189*	*246*
Nonindustrial injuries (169–195)	10.9	12.0	12.1	18.5	15.7	19.7
Sickness	84.6	103.7	92.4	236.0	203.1	237.5
Respiratory diseases	27.0	43.6	32.4	98.2	89.5	104.5
Tuberculosis of respiratory system (13)	.7	.7	.6	.9	.6	.4
Influenza, grippe (33)	8.0	17.7	10.4	24.6	31.6	31.9
Bronchitis, acute and chronic (106)	4.4	6.9	5.9	12.1	10.4	13.0
Pneumonia, all forms (107–109)	4.0	4.9	4.3	5.5	3.1	4.4
Diseases of pharynx and tonsils (115b, 115c)	3.4	5.0	3.6	15.9	15.6	17.6
Other respiratory diseases (104, 105, 110–114)	6.5	8.4	7.6	39.2	28.2	37.2
Digestive diseases	16.8	17.3	17.4	27.9	29.6	31.1
Diseases of stomach except cancer (117, 118)	5.3	5.4	5.7	3.6	3.1	4.1
Diarrhea and enteritis (120)	2.1	2.1	2.2	6.9	5.3	6.8
Appendicitis (121)	3.5	4.2	3.6	7.8	12.7	9.6
Hernia (122a)	2.7	2.3	2.5	.5	.6	1.4
Other digestive diseases (115a, 115d, 116, 122b–129)	3.2	3.3	3.4	9.1	7.9	9.2
Nonrespiratory-nondigestive diseases	38.5	39.4	39.7	105.3	79.1	97.0
Infectious and parasitic diseases (1–12, 14–24, 26–29, 31, 32, 34–44) [4]	2.2	2.5	2.6	9.2	5.3	5.9
Cancer, all sites (45–55)	.8	.6	.6	.8	.5	.7
Rheumatism, acute and chronic (58, 59)	3.8	4.5	4.1	5.2	4.2	5.0
Neurasthenia and the like (part of 84d)	1.6	1.8	1.8	11.1	10.6	11.0
Neuralgia, neuritis, sciatica (87b)	2.0	2.6	2.3	3.8	2.8	2.7
Other diseases of nervous system (80–85, 87, except part of 84d and 87b)	1.8	1.6	1.6	3.0	1.7	2.1
Diseases of heart (90–95)	4.4	3.9	4.3	3.0	2.2	1.9
Diseases of arteries and high blood pressure (96–99, 102)	2.0	1.9	2.1	1.4	1.2	1.4
Other diseases of circulatory system (100, 101, 103)	3.8	3.7	3.9	8.0	5.3	6.3
Nephritis, acute and chronic (130–132)	.4	.4	.3	.6	.4	.5
Other diseases of genitourinary system (133–139)	3.8	3.0	3.2	26.5	17.7	25.9
Diseases of skin (151–153)	3.1	3.3	3.5	5.6	5.2	6.1
Diseases of organs of movement except diseases of joints (156b)	2.8	3.3	3.2	7.5	5.0	6.8
All other diseases (56, 57, 60–79, 88, 89, 154, 155, 156a, 157, 162)	6.5	6.3	6.2	19.6	17.0	20.7
Ill-defined and unknown causes (200)	2.3	3.4	2.9	4.6	4.9	4.9
Average number of persons	210,494	2,427,654	218,419	15,116	217,472	20,728

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[1] Industrial injuries and venereal diseases are not included.

[2] Numbers in parentheses are disease title numbers from International List of Causes of Death, 1939.

[3] Average of the 10 annual rates.

[4] Exclusive of influenza and grippe, respiratory tuberculosis, and venereal diseases.

nondigestive causes exceeds the corresponding rate for 1948. The 1948 rates, in turn, are generally higher than rates for the 10-year period.

Frequency of Sickness Absenteeism, 1940–49. Figures 1 and 2 present graphically the frequency rates for the broad cause groups, 1940–49. Notable sex differences will be observed in the variation of the rates with time. Thus, among males the frequency of all sickness and nonindustrial injuries shows a marked hump during the years 1943–45, preceded by relatively slight increases in 1941 and 1942, and followed by decreasing rates in 1946–49; the rates for 1940 and 1949 are approximately the same (96 absences per 1,000 males). Among females, on the other hand, the rate for all causes rises from 153 absences per 1,000 females in 1940 to 258 absences per 1,000 fe-

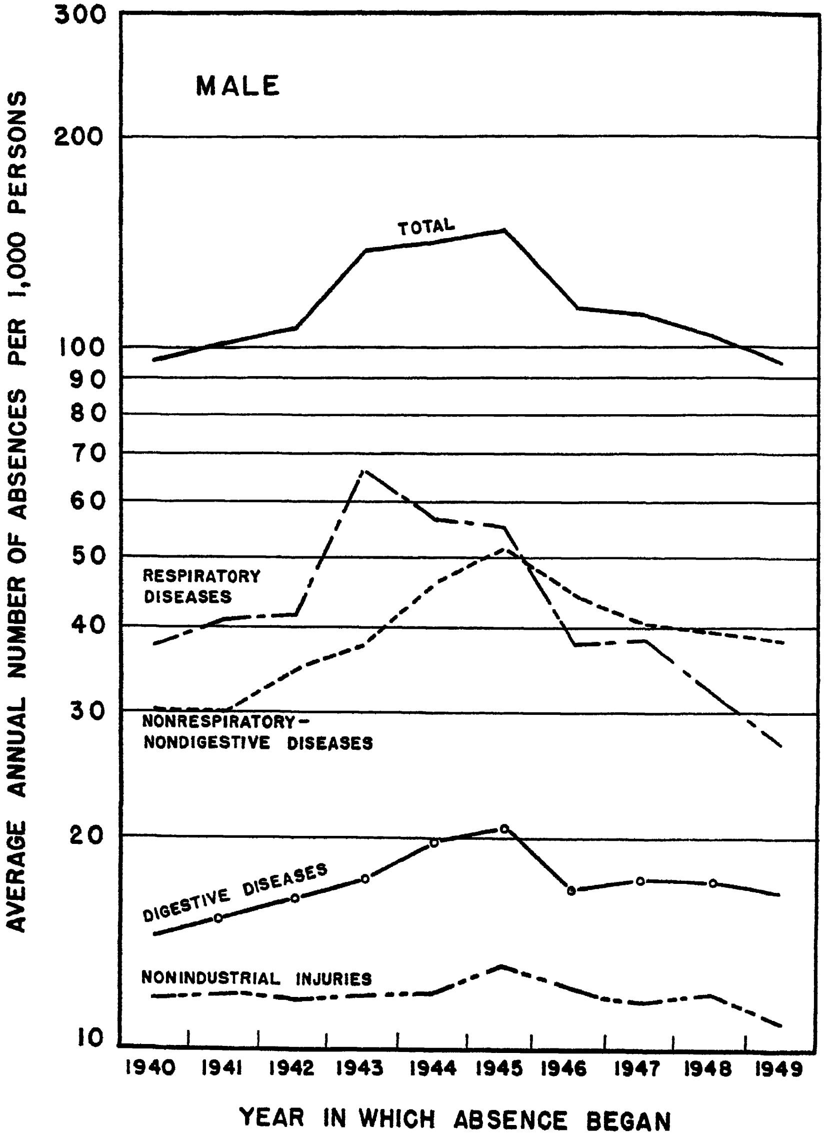

Figure 1. Annual number of absences per 1,000 persons on account of sickness and nonindustrial injuries lasting more than 1 week; experience of male employees in various industries, 1940–49, inclusive. (Logarithmic vertical scale.)

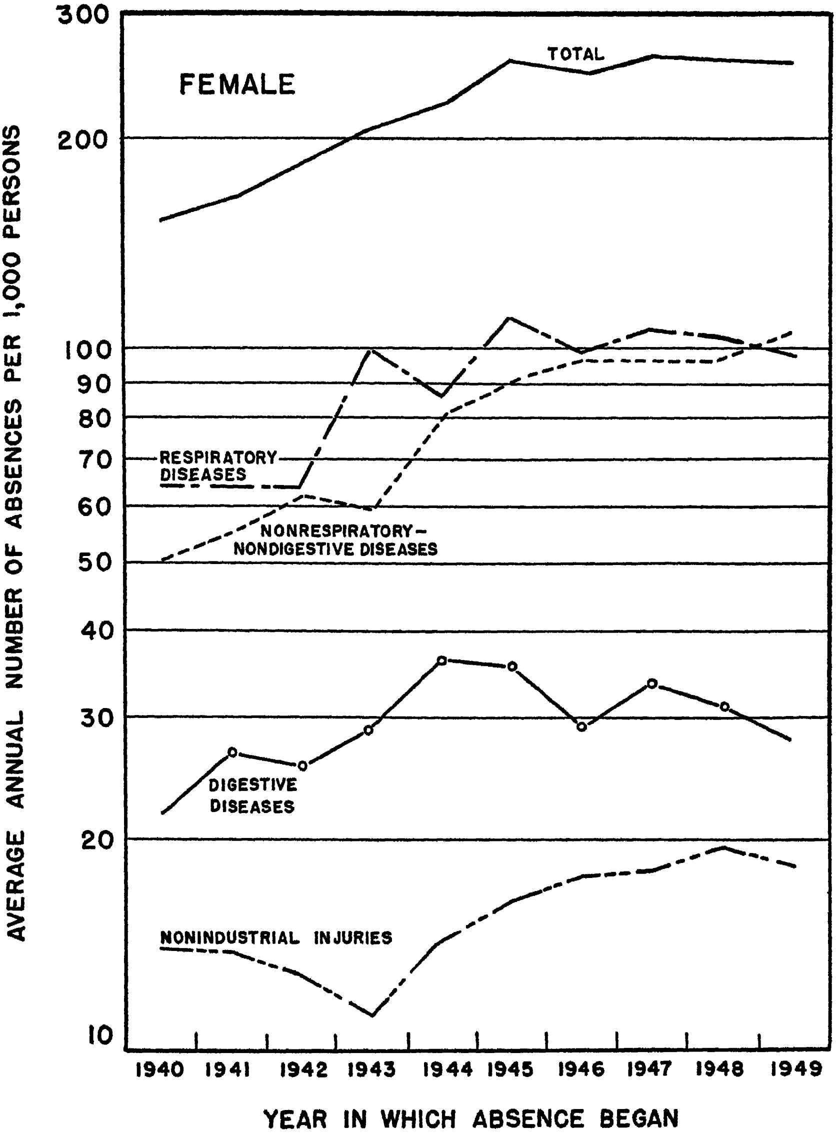

Figure 2. Annual number of absences per 1,000 persons on account of sickness and nonindustrial injuries lasting more than 1 week; experience of female employees in various industries, 1940–49, inclusive. (Logarithmic vertical scale.)

males in 1945, an increase of over 65 percent. The rates remain at this high level throughout the years, 1946–49.

Respiratory diseases among males exhibit a hump in 1943–45 which is more marked than the corresponding one observed in the frequency of all causes; moreover, the respiratory rates for 1946–49 exhibit a relatively rapid decrease, the rate for 1949 (27 per 1,000 males) being almost 30 percent below the corresponding rate for 1940 (38 absences per 1,000 males). Digestive and nonrespiratory-nondigestive diseases among males reveal an increasing trend during the years 1940–45. They decrease in 1946 and tend to remain relatively stable in 1947–49. Attention is directed to the contribution made by each of the three disease groups to the total rate. After 1943 the increases in the nonrespiratory-nondigestive and digestive groups are sufficiently high to dampen the effect on the total rate of the decreasing respiratory group. This pattern is not evident in the instance of the females.

Among females, both respiratory and nonrespiratory-nondigestive diseases show marked increases in frequency over the 10 years. In the years 1946–49, each of these two cause groups accounts for an

Table 2. *Number of absences per 1,000 males (annual basis) on account of sickness and nonindustrial injuries disabling for 8 consecutive calendar days or longer, by cause; experience of male employees in various industries, first and second quarters of 1950* [1]

Cause [2]	Number of absences per 1,000 males (annual basis) beginning in specified period						
	Second quarter		First quarter		First half		
	1950	1949	1950	1949	1950	1949	1945–49
Sickness and nonindustrial injuries	118.2	93.2	128.7	117.3	123.4	105.2	125.5
Nonindustrial injuries (169–195)	14.5	10.2	11.4	11.8	12.9	11.0	12.4
Sickness	103.7	83.0	117.3	105.5	110.5	94.2	113.1
Respiratory diseases	35.4	24.9	52.9	40.6	44.2	32.8	46.1
Tuberculosis of respiratory system (13)	.6	.8	.5	.6	.5	.7	.7
Influenza, grippe (33)	11.9	6.7	20.3	14.4	16.1	10.6	17.9
Bronchitis, acute and chronic (106)	6.1	4.4	8.4	6.1	7.3	5.2	7.3
Pneumonia, all forms (107–109)	5.4	3.8	7.9	5.5	6.7	4.7	5.2
Diseases of pharynx and tonsils (115b, 115c)	3.6	3.4	3.3	5.1	3.4	4.3	5.0
Other respiratory diseases (104, 105, 110–114)	7.8	5.8	12.5	8.9	10.2	7.3	10.0
Digestive diseases	19.9	17.1	17.8	18.6	18.8	17.8	18.1
Diseases of stomach, except cancer (117, 118)	5.4	5.3	5.7	5.9	5.5	5.6	5.9
Diarrhea and enteritis (120)	2.7	1.9	2.7	2.4	2.7	2.1	2.2
Appendicitis (121)	4.2	3.8	3.1	4.0	3.6	3.9	3.7
Hernia (122a)	3.3	2.7	2.6	2.7	3.0	2.7	2.8
Other digestive diseases (115a, 115d, 116, 122b–129)	4.3	3.4	3.7	3.6	4.0	3.5	3.5
Nonrespiratory-nondigestive diseases	44.3	38.6	43.1	43.8	43.7	41.2	44.9
Infectious and parasitic diseases (1–12, 14–24, 26–29, 31, 32, 34–44) [3]	3.1	2.7	3.7	3.0	3.4	2.9	3.2
Rheumatism, acute and chronic (58, 59)	3.6	4.3	3.7	4.6	3.7	4.4	5.3
Neurasthenia and the like (part of 84d)	1.5	1.7	1.3	1.9	1.4	1.8	2.0
Neuralgia, neuritis, sciatica (87b)	2.2	2.2	2.0	2.3	2.1	2.3	2.9
Other diseases of nervous system (80–85, 87, except part of 84d and 87b)	2.1	1.6	2.3	2.0	2.2	1.8	1.9
Diseases of heart and arteries, and nephritis (90–99, 102, 130–132)	7.7	6.7	8.1	7.8	7.9	7.2	7.8
Other diseases of genitourinary system (133–138)	4.4	3.2	3.9	3.2	4.2	3.2	3.2
Diseases of skin (151–153)	3.0	2.8	2.9	3.3	2.9	3.1	3.3
Diseases of organs of movement, except diseases of joints (156b)	3.3	2.3	2.9	3.2	3.1	2.7	3.4
All other diseases (45–57, 60–79, 88, 89, 100, 101, 103, 154, 155, 156a, 157, 162)	13.4	11.1	12.3	12.5	12.8	11.8	11.9
Ill-defined and unknown causes (200)	4.1	2.4	3.5	2.5	3.8	2.4	4.0
Average number of males	155,227	199,308	160,248	201,310	157,821	200,309	1,012,232

[1] Industrial injuries and venereal diseases are not included.
[2] Numbers in parentheses are disease title numbers from International List of Causes of Death, 1939.
[3] Exclusive of influenza and grippe, respiratory tuberculosis, and venereal diseases.

average of one absence for every 10 female workers, representing an increase of 50 percent in the frequency of respiratory diseases, and a doubling of the frequency of nonrespiratory-nondigestive diseases when compared with corresponding rates for 1940.

It is difficult to evaluate the contribution of various factors in the war and postwar periods to the observed time changes in frequency of disability. Data on a number of factors, such as the changing composition of the employed population, are not available. Moreover, a number of psychological factors are not susceptible to quantitative measurement. Nevertheless, the striking increases in frequency of disability among females together with the persistence of relatively high rates for nonrespiratory-nondigestive diseases among males (reflecting principally the circulatory diseases), reemphasize the importance of adult health problems in the field of industrial health.

Males, First and Second Quarters, 1950

Male frequency rates by cause are given in table 2 for the first and second quarters of 1950 and 1949. Attention is directed to the increased frequency of respiratory diseases recorded for each quarter of 1950 when compared with the corresponding quarter of 1949. However, rates for the first half of 1950 exhibit remarkably little difference from corresponding rates for the first half of the 5-year period, 1945–49.

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Incidence of Disease

No health department, State or local, can effectively prevent or control disease without knowledge of when, and under what conditions cases are occurring

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UNITED STATES

Reports from States for Week Ended November 4, 1950

A total of 1,089 new cases of acute poliomyelitis was reported during the current week, which was 17 percent less than the previous week when 1,315 cases were reported. The corresponding figure for 1949 was 879 cases.

The cumulative total (27,783) cases of poliomyelitis for the current "disease" year was well below that for the corresponding total (38,108) for last year. The cumulative total (28,914) for the calendar year is also well below (39,029) for the corresponding period last year.

Seven of 9 geographic divisions showed decreases in the incidence of poliomyelitis compared with the previous week ranging from 2 cases in the New England States to 128 cases in the East North Central

Comparative Data For Cases of Specified Reportable Diseases: United States

[Numbers after diseases are International List numbers, 1948 revision]

Disease	Total for week ended—		5-year median, 1945–49	Seasonal low week	Cumulative total since seasonal low week		5-year median, 1944–45 through 1948–49	Cumulative total for calendar year—		5-year median, 1945–49
	Nov. 4 1950	Nov. 5 1949			1949–50	1948–49		1950	1949	
Anthrax (062)	--------	1	(1)	(1)	(1)	(1)	(1)	40	45	(1)
Diphtheria (055)	171	227	331	27th	1,877	2,675	3,512	5,005	6,443	9,809
Acute infectious encephalitis (082)	25	15	13	(1)	(1)	(1)	(1)	841	678	560
Influenza (480–483)	1,944	1,648	1,648	30th	16,314	12,403	13,233	262,573	88,330	156,201
Measles (085)	1,315	834	1,261	35th	7,120	5,277	7,018	295,291	593,795	562,393
Meningococcal meningitis (057.0)	41	76	55	37th	408	401	401	3,207	2,917	2,977
Pneumonia (490–493)	1,169	1,176	--------	(1)	(1)	(1)	(1)	69,921	66,114	--------
Acute poliomyelitis (080)	1,089	879	564	11th	[2]27,783	38,108	22,474	[2]28,914	39,021	22,941
Rocky Mountain spotted fever (104)	--------	2	3	(1)	(1)	(1)	(1)	445	551	538
Scarlet fever (050)	892	988	1,468	32d	6,207	6,568	8,507	46,377	64,234	70,223
Smallpox (084)	2	--------	--------	35th	3	3	5	29	44	152
Tularemia (059)	11	11	11	(1)	(1)	(1)	(1)	778	971	820
Typhoid and paratyphoid fever (040, 041) [3]	71	46	79	11th	2,542	2,996	2,996	3,051	3,484	3,484
Whooping cough (056)	1,673	1,560	1,742	39th	7,582	7,153	7,925	104,777	53,755	83,800

[1] Not computed.

[2] Deductions: Michigan, weeks ended Oct. 7 and 28, 1 case each; New Mexico, weeks ended Mar. 4, May 13, and Sept. 9, 1 case each.

[3] Including cases reported as salmonellosis.

States. There was no change in the number of cases in the South Atlantic States, and the Mountain States showed an increase from 24 to 34 cases. Only New York State and Michigan reported 100 or more cases.

The total number of cases of diphtheria reported for the current week was 171 compared with 150 for the previous week and 227 for the corresponding week last year. There were 55 cases of typhoid fever reported for the current week compared with 35 for the corresponding week last year. The number of whooping-cough cases was 1,673 compared with 1,560 for the corresponding week last year. The cumulative total of 7,582 cases for the "disease" year is 6 percent above that (7,153) for the corresponding period of last year.

One case of smallpox was reported in Ohio and 1 in Missouri.

Deaths During Week Ended November 4, 1950

	Week ended Nov. 4, 1950	*Corresponding week, 1949*
Data for 94 large cities of the United States:		
Total deaths	9, 099	9, 160
Median for 3 prior years	9, 031	----------
Total deaths, first 44 weeks of year	402, 839	402, 741
Deaths under 1 year of age	664	635
Median for 3 prior years	670	----------
Deaths under 1 year of age, first 44 weeks of year	27, 338	28, 755
Data from industrial insurance companies:		
Policies in force	69, 627, 901	70, 079, 429
Number of death claims	12, 655	11, 990
Death claims per 1,000 policies in force, annual rate	9. 5	8. 9
Death claims per 1,000 policies, first 44 weeks of year, annual rate	9. 2	9. 2

Reported Cases of Selected Communicable Diseases: United States, Week Ended November 4, 1950

[Numbers under diseases are International List numbers, 1948 revision]

Area	Diphtheria (055)	Encephalitis, infectious (082)	Influenza (480–483)	Measles (085)	Meningitis, meningococcal (057.0)	Pneumonia (490–493)	Poliomyelitis (080)
United States	**171**	**25**	**1, 944**	**1, 315**	**41**	**1, 169**	**1, 089**
New England	**2**	----------	----------	**50**	**1**	**18**	**43**
Maine	----------	----------	----------	----------	----------	7	2
New Hampshire	----------	----------	----------	----------	----------	----------	----------
Vermont	1	----------	----------	----------	----------	----------	1
Massachusetts	1	----------	----------	39	1	----------	26
Rhode Island	----------	----------	----------	6	----------	3	4
Connecticut	----------	----------	----------	5	----------	8	10
Middle Atlantic	**10**	**3**	**1**	**264**	**11**	**302**	**232**
New York	3	3	[1] 1	87	8	196	157
New Jersey	3	----------	----------	51	2	60	23
Pennsylvania	4	----------	----------	126	1	46	52
East North Central	**6**	**1**	**30**	**346**	**7**	**107**	**303**
Ohio	4	----------	2	95	3	----------	74
Indiana	----------	----------	----------	8	----------	1	29
Illinois	1	1	----------	76	3	56	63
Michigan	1	----------	----------	53	----------	44	100
Wisconsin	----------	----------	28	114	1	6	37
West North Central	**2**	**3**	**24**	**123**	**3**	**129**	**122**
Minnesota	1	2	----------	3	----------	6	38
Iowa	----------	----------	----------	2	----------	1	31
Missouri	1	----------	4	92	2	11	15
North Dakota	----------	1	4	11	----------	104	1
South Dakota	----------	----------	----------	12	----------	----------	3
Nebraska	----------	----------	16	1	----------	----------	13
Kansas	----------	----------	----------	2	1	7	21
South Atlantic	**63**	----------	**459**	**89**	**4**	**246**	**144**
Delaware	1	----------	----------	6	----------	----------	1
Maryland	1	----------	1	3	----------	17	40
District of Columbia	----------	----------	1	2	----------	24	4
Virginia	2	----------	236	7	1	24	18
West Virginia	3	----------	191	53	----------	24	10
North Carolina	32	----------	----------	9	1	----------	15
South Carolina	6	----------	24	----------	----------	11	6
Georgia	14	----------	6	5	2	129	16
Florida	4	----------	----------	4	----------	17	34
East South Central	**37**	**1**	**18**	**74**	**3**	**29**	**40**
Kentucky	5	----------	2	56	1	5	12
Tennessee	4	----------	11	9	1	----------	5
Alabama	21	----------	3	2	1	10	5
Mississippi	7	1	2	7	----------	14	18
West South Central	**41**	**6**	**1, 301**	**91**	**6**	**265**	**60**
Arkansas	10	1	77	21	----------	30	4
Louisiana	2	----------	----------	4	----------	19	8
Oklahoma	3	1	48	2	2	27	13
Texas	26	4	1, 176	64	4	189	35
Mountain	**5**	----------	**93**	**121**	**1**	**51**	**34**
Montana	1	----------	5	6	----------	----------	2
Idaho	----------	----------	16	11	----------	8	4
Wyoming	----------	----------	----------	----------	----------	----------	1
Colorado	----------	----------	8	47	1	34	7
New Mexico	----------	----------	----------	26	----------	3	3
Arizona	4	----------	64	1	----------	6	16
Utah	----------	----------	----------	30	----------	----------	1
Nevada	----------	----------	----------	----------	----------	----------	----------
Pacific	**5**	**11**	**18**	**157**	**5**	**22**	**111**
Washington	----------	----------	5	46	2	----------	27
Oregon	1	----------	9	6	1	5	23
California	4	11	4	105	2	17	61
Alaska	----------	----------	----------	----------	----------	3	3
Hawaii	1	----------	88	1	----------	----------	----------

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[1] New York City only.

Reported Cases of Selected Communicable Diseases: United States, Week Ended November 4, 1950—Continued

[Numbers under diseases are International List numbers, 1948 revision]

Area	Rocky Mountain spotted fever (104)	Scarlet fever (050)	Smallpox (084)	Tularemia (059)	Typhoid and paratyphoid fever [1] (040, 041)	Whooping cough (056)	Rabies in animals
United States	----------	**892**	**2**	**11**	**71**	**1,673**	**96**
New England	----------	**65**	----------	----------	**1**	**201**	----------
Maine	----------	----------	----------	----------	----------	22	----------
New Hampshire	----------	2	----------	----------	----------	2	----------
Vermont	----------	2	----------	----------	----------	51	----------
Massachusetts	----------	54	----------	----------	1	61	----------
Rhode Island	----------	----------	----------	----------	----------	40	----------
Connecticut	----------	7	----------	----------	----------	25	----------
Middle Atlantic	----------	**107**	----------	----------	**13**	**235**	**14**
New York	----------	[2] 50	----------	----------	8	112	13
New Jersey	----------	15	----------	----------	2	68	----------
Pennsylvania	----------	42	----------	----------	3	55	1
East North Central	----------	**215**	**1**	**1**	**16**	**397**	**8**
Ohio	----------	84	1	----------	12	74	2
Indiana	----------	14	----------	----------	----------	16	----------
Illinois	----------	35	----------	----------	1	32	2
Michigan	----------	82	----------	1	3	138	4
Wisconsin	----------	----------	----------	----------	----------	137	----------
West North Central	----------	**45**	**1**	----------	**1**	**136**	**6**
Minnesota	----------	11	----------	----------	----------	20	----------
Iowa	----------	8	----------	----------	----------	55	5
Missouri	----------	----------	1	----------	1	16	----------
North Dakota	----------	----------	----------	----------	----------	19	----------
South Dakota	----------	----------	----------	----------	----------	6	----------
Nebraska	----------	7	----------	----------	----------	1	----------
Kansas	----------	19	----------	----------	----------	19	1
South Atlantic	----------	**154**	----------	**4**	**11**	**267**	**20**
Delaware	----------	2	----------	----------	1	1	----------
Maryland	----------	10	----------	----------	----------	17	----------
District of Columbia	----------	4	----------	----------	----------	4	----------
Virginia	----------	19	----------	2	2	93	----------
West Virginia	----------	19	----------	----------	4	48	2
North Carolina	----------	72	----------	1	2	67	----------
South Carolina	----------	8	----------	----------	----------	8	11
Georgia	----------	11	----------	----------	2	10	7
Florida	----------	9	----------	1	----------	19	----------
East South Central	----------	**117**	----------	----------	**2**	**71**	**15**
Kentucky	----------	61	----------	----------	----------	42	2
Tennessee	----------	30	----------	----------	----------	5	6
Alabama	----------	21	----------	----------	1	24	4
Mississippi	----------	5	----------	----------	1	----------	3
West South Central	----------	**50**	----------	**5**	**15**	**236**	**32**
Arkansas	----------	5	----------	2	----------	29	2
Louisiana	----------	1	----------	----------	2	32	----------
Oklahoma	----------	7	----------	1	1	15	1
Texas	----------	37	----------	2	12	160	29
Mountain	----------	**33**	----------	**1**	**8**	**60**	----------
Montana	----------	6	----------	----------	1	14	----------
Idaho	----------	2	----------	----------	1	6	----------
Wyoming	----------	3	----------	----------	----------	----------	----------
Colorado	----------	8	----------	----------	----------	8	----------
New Mexico	----------	1	----------	----------	4	1	----------
Arizona	----------	7	----------	----------	2	29	----------
Utah	----------	6	----------	1	----------	2	----------
Nevada	----------	----------	----------	----------	----------	----------	----------
Pacific	----------	**106**	----------	----------	**4**	**70**	**1**
Washington	----------	28	----------	----------	1	19	----------
Oregon	----------	7	----------	----------	----------	11	----------
California	----------	71	----------	----------	3	40	1
Alaska	----------	----------	----------	----------	----------	----------	----------
Hawaii	----------	3	----------	----------	----------	----------	----------

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[1] Including cases reported as salmonellosis.
[2] Including cases reported as streptococcal sore throat.

Rabies in man: North Carolina 1 case.

FOREIGN REPORTS

CANADA

Reported Cases of Certain Diseases—Week Ended Oct. 21, 1950

Disease	New-foundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Brucellosis					1	1	1		1	4	8
Chickenpox			56		198	212	25	87	82	92	752
Diphtheria					7	2					9
Dysentery, bacillary					10	1	5			3	19
German measles			2	1	2	51		4	6	7	73
Influenza			26				3			4	33
Measles			14		83	192	19	39	4	104	455
Meningitis, meningococcal			1		1	2					4
Mumps			11		82	150	16	69	98	95	521
Poliomyelitis						6	1	1	6		14
Scarlet fever	3		2		34	51	5	14	42	28	179
Tuberculosis (all forms)	3		5	17	120	34	37	10	4	44	274
Typhoid and paratyphoid fever				2	11					5	18
Venereal diseases:											
Gonorrhea	4		7	4	61	62	39	31	46	85	339
Syphilis	2			7	38	20	1	7	4	14	93
Primary				1	4	3		2			10
Secondary					2	3					5
Other syphilis	2			6	32	14	1	5	4	14	78
Whooping cough			3	15	86	155	21	2	4	20	306

MADAGASCAR

Reported Cases of Certain Diseases and Deaths—September 1950

Disease	Aliens		Natives	
	Cases	Deaths	Cases	Deaths
Bilharziasis	3		35	
Diphtheria	2		4	1
Dysentery:				
Amebic	3		148	3
Bacillary			75	3
Erysipelas			12	
Influenza	83	1	3,777	35
Leprosy			29	
Malaria	205		22,651	87
Measles	23		94	
Meningitis, meningococcal	1	1	8	4
Mumps	3		69	
Plague			4	4
Pneumonia (all forms)	8	1	1,083	121
Puerperal infection			2	
Relapsing fever			1	
Trachoma			1	
Tuberculosis, respiratory	10	2	76	10
Typhoid fever	1		1	
Whooping cough	2		229	6

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

The following tables are not complete or final for the list of countries included or for the figures given. Since many of the figures are from weekly reports, the accumulated totals are for approximate dates.

CHOLERA

(Cases)

Place	January-August 1950	September 1950	October 1950—week ended—			
			7	14	21	28
ASIA						
Burma	415	52	3			
Akyab	2					
Bassein	3					
Kyaukpyu	1	1				
Maubin	3					
Moulmein		1				
Pegu	1					
Rangoon	6					
Toungoo	7	1				
India	99,253	15,754	[1] 1,765			
Ahmedabad	8	2				
Allahabad	3					
Bombay	[2] 419	10	1			
Calcutta	[2] 8,895	162	17	19	28	41
Cawnpore	1					
Cocanada	2					
Cuddalore	31	5	1			3
Lucknow	12					
Madras	[2] 22	243	248	173	110	89
Masulipatam	47					
Nagpur	31	29	6	5		
Negapatam	88	10				
New Delhi	117	8				
Port Blair (Andaman Islands)	[3] 2					
Tellicherry	27					
Tiruchirappali	1					
Trichinopoly	1					
Tuticorin	25	1				
India (French)	1,071	81	8	2		
Karikal	382	8	4	1		
Pondicherry	689	73	4	1		
India (Portuguese)	17					
Indochina	19	1				
Cambodia	5					
Viet Nam	14	1				
Giadinh	3					
Rachgia	1					
Saigon		1				
Pakistan	23,160	578	100	103		
Chittagong	136					
Dacca	191	1				

[1] Preliminary figures. [2] Includes imported cases. [3] Imported.

PLAGUE

(Cases)

AFRICA						
Belgian Congo	28	1		1	2	
Costermansville Province	[1] 14			[2] 1		
Stanleyville Province	14	[2] 1			[3] [4] 2	
Madagascar	52	4		[5] 8		
Rhodesia, Northern	2					
Union of South Africa	11					
Orange Free State	8					
Transvaal Province	1					
Johannesburg	[2] 1					

[1] Includes 9 cases of pneumonic plague.
[2] Pneumonic plague.
[3] Includes 1 case of pneumonic plague.
[4] Oct. 7–19, 1950.
[5] Oct. 1–10, 1950.

PLAGUE—Continued

Place	January-August 1950	September 1950	October 1950—week ended— 7	14	21	28
ASIA						
Burma	[6] 236	4	2	---	---	---
Bassein	1	---	---	---	---	---
Bhamo	[6] 4	---	---	---	---	---
Henzada	15	---	---	---	---	---
Kyaiklat	34	---	---	---	---	---
Minhla	2	---	---	---	---	---
Moulmein	[6] 3	---	---	---	---	---
Myaungmya	5	---	---	---	---	---
Myingyan	2	---	---	---	---	---
Pegu	4	[7] 1	---	---	---	---
Pyapon	3	---	---	---	---	---
Rangoon	[6] 8	---	---	---	---	---
Yenangyaung	58	---	---	---	---	---
China:						
Chekiang Province	[8] 37	---	---	---	---	---
Wenchow	[9] 4	---	---	---	---	---
Fukien Province	945	---	---	---	---	---
Amoy	10	---	---	---	---	---
Kwangsi Province	[9] 63	---	---	---	---	---
Kwangtung Province	622	---	---	---	---	---
India	37,265	[10] 1,214	[10] 50	---	---	---
Allahabad	[7] 19	---	---	---	---	---
Bombay	[6] 5	---	---	---	---	---
Calcutta	[6] 3	---	---	---	---	---
Cawnpore	18	---	---	---	---	---
Lucknow	[6] 9	---	---	1	---	---
Indochina:						
Annam	83	3	2	2	1	---
Phanthiet	79	3	2	2	1	---
Cambodia	[11] 46	---	---	---	---	---
Pnompenh	3	---	---	---	---	---
Cochinchina	26	---	---	---	---	---
Saigon	1	---	---	---	---	---
Laos	2	---	---	---	---	---
Indonesia:						
Java	399	15	1	3	---	---
Bandoeng	3	---	---	---	---	---
Djakarta	[6] 3	---	---	---	---	---
Jogjakarta	213	15	1	3	---	---
Pakistan	1	---	---	---	---	---
Karachi	[7] 1	---	---	---	---	---
Thailand	56	---	---	---	---	---
SOUTH AMERICA						
Brazil	18	---	---	---	---	---
Alagoas State	3	---	---	---	---	---
Bahia State	9	---	---	---	---	---
Ceara State	2	---	---	---	---	---
Pernambuco State	4	---	---	---	---	---
Sao Paulo State: Santos	---	---	[7] 1	---	---	---
Ecuador	28	---	---	---	---	---
Chimborazo Province	4	---	---	---	---	---
El Oro Province	4	---	---	---	---	---
Loja Province	20	---	---	---	---	---
Peru	78	---	---	---	---	---
Ancash Department	3	---	---	---	---	---
Lambayeque Department	2	---	---	---	---	---
Libertad Department	1	---	---	---	---	---
Lima Department	5	---	---	---	---	---
Piura Department	7	---	---	---	---	---
Venezuela	5	---	---	---	---	---
Miranda State	5	---	---	---	---	---

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[6] Includes imported cases.
[7] Imported.
[8] Includes 4 cases of pneumonic plague.
[9] Deaths.
[10] Preliminary figures.
[11] Includes suspected cases.

SMALLPOX

(Cases)

Place	January-August 1950	September 1950	October 1950—week ended—			
			7	14	21	28
AFRICA						
Algeria	97	3	----	----	----	----
Angola	270	----	----	----	----	----
Bechuanaland	77	----	----	----	----	----
Belgian Congo	2,826	791	150	119	----	----
British East Africa:						
Kenya	10	----	----	----	----	----
Nyasaland	[1] 248	8	----	----	----	----
Tanganyika	3,447	404	----	----	----	----
Uganda	3	----	----	----	----	----
Cameroon (British)	408	10	----	----	----	----
Cameroon (French)	93	1	----	[2] 22	----	----
Dahomey	280	66	----	[2] 1	[3] 42	----
Egypt	[4] 4	----	----	----	----	----
Eritrea	1	----	----	----	----	----
Ethiopia	30	----	----	----	----	----
French Equatorial Africa	449	5	----	----	----	----
French Guinea	12	----	----	----	----	----
French West Africa: Haute Volta	205	3	----	----	----	----
Gambia	5	----	----	----	----	----
Gold Coast	223	6	----	----	----	----
Ivory Coast	613	36	----	[2] 3	----	----
Libya	2	----	----	----	----	----
Mauritania	1	----	----	----	----	----
Morocco (French)	10	----	----	----	----	----
Mozambique	207	38	----	----	----	----
Nigeria	14,767	463	----	----	----	----
Niger Territory	1,069	23	----	[2] 10	----	----
Rhodesia:						
Northern	4	1	----	----	----	----
Southern	544	----	----	----	----	----
Senegal	2	----	----	----	----	----
Sierra Leone	31	----	----	----	----	----
Sudan (Anglo-Egyptian)	74	----	1	----	----	----
Sudan (French)	179	37	----	[2] 9	----	----
Togo (French)	72	30	----	----	[3] 3	----
Tunisia	1	----	----	----	----	----
Union of South Africa	632	5	----	----	----	----
ASIA						
Afghanistan	308	----	----	----	----	----
Arabia	333	[5] 3	----	----	----	----
Bahrein Islands: Bahrein	36	----	----	----	----	----
Kamaran Island: Kamaran	----	[5] 2	----	----	----	----
Burma	[1] 4,993	4	3	----	----	----
Ceylon	[4] 2	----	----	----	----	----
China	750	4	2	----	----	----
India	118,001	4,500	238	----	----	----
India (French)	242	125	20	35	----	----
India (Portuguese)	90	3	----	----	----	----
Indochina	362	3	1	----	----	----
Indonesia:						
Borneo	635	144	8	----	----	----
Java	6,352	864	78	65	----	----
Sumatra	344	1	1	----	----	----
Iran	234	5	----	----	----	----
Iraq	[4] 144	[4] 16	1	[4] 9	1	----
Israel	16	----	----	----	----	----
Japan	6	----	----	----	----	----
Korea (Republic of)	1,331	----	----	----	----	----
Lebanon	2	----	----	----	----	----
Netherlands New Guinea	3	----	----	----	----	----
Pakistan	15,255	202	----	----	----	----
Palestine	95	----	----	----	----	----
Straits Settlements:						
Singapore	[4] 2	----	----	----	----	----
Syria	15	----	----	----	----	----
Thailand	460	----	----	----	----	----
Transjordan	35	----	----	----	----	----
Turkey (See Turkey in Europe.)						
United Nations Relief and Works Agency for Palestine Refugees	15	----	----	----	----	----

See footnotes at end of table.

SMALLPOX—Continued

Place	January-August 1950	September 1950	October 1950—week ended—			
			7	14	21	28
EUROPE						
Great Britain:						
England: Liverpool	[5] 1	----------	----------	----------	----------	----------
Scotland: Glasgow	21	----------	----------	----------	----------	----------
Greece	15	----------	----------	----------	----------	----------
Athens	1	----------	----------	----------	----------	----------
Piraeus	1	----------	----------	----------	----------	----------
Xylokastron	1	----------	----------	----------	----------	----------
Portugal	1	----------	----------	----------	----------	----------
Spain: Canary Islands	1	----------	----------	----------	----------	----------
Turkey	[1] 5	1	----------	----------	----------	----------
NORTH AMERICA						
Guatemala	5	----------	----------	----------	----------	----------
Mexico	506	----------	----------	----------	----------	----------
SOUTH AMERICA						
Argentina	517	----------	----------	----------	----------	----------
Brazil	79	18	1	----------	----------	----------
Chile	3, 581	[6] 7	----------	----------	----------	----------
Colombia	573	13	5	2	----------	----------
Ecuador	117	18	----------	----------	----------	----------
Paraguay	4	----------	----------	----------	----------	----------
Peru	2, 315	----------	----------	----------	----------	----------
Venezuela	1, 216	----------	----------	----------	----------	----------
OCEANIA						
Australia: Freemantle	[5] 1	----------	----------	----------	----------	----------

[1] Corrected figure. [2] Oct. 1–10, 1950. [3] Oct. 11–20, 1950.
[4] Including imported cases. [5] Imported. [6] Aug. 13 to Sept. 16.

TYPHUS FEVER *

(Cases; P=Present)

AFRICA						
Algeria	106	2	----------	----------	----------	----------
Basutoland	24	----------	----------	----------	----------	----------
Belgian Congo	[1] 83	[2] 5	[2] 2	----------	----------	----------
British East Africa:						
Kenya	23	----------	----------	----------	----------	----------
Mombasa	[2] 3	----------	----------	----------	----------	----------
Uganda	2	----------	----------	----------	----------	----------
Egypt	86	3	1	----------	----------	----------
Eritrea	20	9	1	2	----------	----------
Ethiopia	683	----------	----------	----------	----------	----------
French Equatorial Africa	5	----------	----------	----------	----------	----------
Gold Coast	9	----------	----------	----------	----------	----------
Libya:						
Cyrenaica	27	----------	----------	----------	----------	----------
Tripolitania	70	----------	----------	----------	----------	----------
Madagascar	[1] 2	----------	----------	----------	----------	----------
Morocco (French)	8	1	----------	----------	----------	----------
Morocco (International Zone)	1	----------	----------	----------	----------	----------
Morocco (Spanish Zone)	6	----------	----------	----------	----------	----------
Mozambique	3	----------	----------	----------	----------	----------
Nigeria	1	----------	----------	----------	----------	----------
Rhodesia, Southern	[1] 7	----------	----------	----------	----------	----------
Sierra Leone	[2] 5	----------	----------	----------	----------	----------
Sudan (Anglo-Egyptian)	4	----------	----------	1	----------	----------
Tunisia	54	5	----------	----------	----------	----------
Union of South Africa	76	P	----------	----------	----------	----------
ASIA						
Afghanistan	[2] 1, 292	5	----------	----------	----------	----------
Burma	[1] 15	----------	----------	----------	----------	----------
China	[1] 20	----------	----------	----------	----------	----------
India	276	7	----------	----------	----------	----------
India (Portuguese)	30	9	----------	----------	----------	----------
Indochina	33	1	2	----------	----------	----------
Indonesia:						
Java	6	----------	----------	----------	----------	----------
Sumatra	1	----------	----------	----------	----------	----------
Iran	[1] 176	----------	----------	----------	----------	----------

See footnotes at end of table.

TYPHUS FEVER—Continued

Place	January-August 1950	September 1950	October 1950—week ended—			
			7	14	21	28
ASIA—continued						
Iraq	128	1	---	---	---	---
Japan	[1] 927	---	---	---	---	---
Korea (Republic of)	[2] 1,183	---	---	---	---	---
Lebanon	2	---	---	---	---	---
Netherlands New Guinea	2	---	---	---	---	---
Pakistan	97	1	---	---	---	---
Palestine	5	---	---	---	---	---
Straits Settlements: Singapore	[1] 6	[2] 2	---	---	---	---
Syria	[1] 37	2	---	---	---	---
Transjordan	27	4	---	---	---	---
Turkey (see Turkey in Europe).						
United Nations Relief and Works Agency for Palestine Refugees	4	---	---	---	---	---
EUROPE						
France	1	---	---	---	---	---
Germany (British Zone)	[1] 2	---	---	---	---	---
Germany (French Zone)	2	---	---	---	---	---
Germany (United States Zone)	2	---	---	---	---	---
Great Britain:						
England: Liverpool	[2] [3] 1	---	---	---	---	---
Island of Malta [2]	26	10	---	---	---	---
Greece	28	---	---	---	---	---
Hungary	4	---	---	---	---	---
Italy	47	---	---	---	---	---
Sicily	36	---	---	---	---	---
Poland	37	---	---	---	---	---
Portugal	2	---	---	---	---	---
Spain	28	15	---	---	---	---
Turkey	[4] 149	11	3	4	12	2
Yugoslavia	247	---	---	---	---	---
NORTH AMERICA						
Costa Rica [2]	15	---	2	---	---	---
Guatemala	29	---	---	---	---	---
Jamaica [2]	27	2	---	---	---	---
Mexico [1]	321	14	2	---	---	---
Panama Canal Zone [2]	3	---	---	---	---	---
Puerto Rico [2]	16	3	---	---	---	---
SOUTH AMERICA						
Argentina	2	---	---	---	---	---
Chile	107	17	---	3	1	---
Colombia	480	12	6	---	---	---
Curacao	[3] 1	---	---	---	---	---
Ecuador	205	6	---	---	---	---
Peru	943	---	---	---	---	---
Venezuela	114	---	---	---	---	---
OCEANIA						
Australia [2]	99	9	---	---	---	---
Hawaii Territory [2]	[4] 6	---	---	---	---	---

---

* Reports from some areas are probably murine type, while others include both murine and louse-borne types.

[1] Includes murine type. Murine. [3] Imported. [4] Corrected figure.

YELLOW FEVER

(C—cases; D—deaths)

AFRICA						
Belgian Congo D	1	---	---	---	---	---
Stanleyville Province D	1	---	---	---	---	---
French Equatorial Africa C	[1] 1	---	---	---	---	---
Port Gentil C	[1] 1	---	---	---	---	---
Gold Coast C	12	---	---	---	---	---
Accra D	[3] 2	---	---	[1] 2	---	---
Ankobra Ferry D	1	---	---	---	---	---
Bogoso C	[1] 1	---	---	---	---	---
Kade C	1	---	---	---	---	---
Oda Area:						
Akwatia C	[3] 7	---	---	---	---	---
Atiankama C	1	---	---	---	---	---

See footnotes at end of table.

Place		January-August 1950	September 1950	October 1950—week ended—			
				7	14	21	28
AFRICA—continued							
Nigeria	D	[2] 2	--------	--------	--------	--------	--------
Calabar	D	[3] 1	--------	--------	--------	--------	--------
Ibadan	D	[1] 1	--------	--------	--------	--------	--------
Sierra Leone	C	[2] 2	--------	--------	--------	--------	--------
Koinadugu District	C	[2] 2	--------	--------	--------	--------	--------
NORTH AMERICA							
Panama:							
Colon	D	1	--------	--------	--------	--------	--------
SOUTH AMERICA							
Bolivia	C	867	--------	--------	--------	--------	--------
Chuquisaca Department	C	[4] 850	--------	--------	--------	--------	--------
La Paz Department	C	[5] 17	--------	--------	--------	--------	--------
Brazil	D	2	--------	--------	--------	--------	--------
Bahia State	D	1	--------	--------	--------	--------	--------
Ipiau	D	1	--------	--------	--------	--------	--------
Maranhao State	D	1	--------	--------	--------	--------	--------
Colinas	D	1	--------	--------	--------	--------	--------
Colombia	D	4	--------	--------	--------	--------	--------
Magdalena Department	D	1	--------	--------	--------	--------	--------
Los Angeles, Rio de Oro	D	1	--------	--------	--------	--------	--------
Putumayo Commissary	D	3	--------	--------	--------	--------	--------
Mocoa Locality	D	3	--------	--------	--------	--------	--------
Santander Department	D	1	--------	--------	--------	--------	--------
Ocana	D	1	--------	--------	--------	--------	--------
Peru	D	4	--------	--------	--------	--------	--------
Cuzco Department	D	2	--------	--------	--------	--------	--------
Quincemil	D	2	--------	--------	--------	--------	--------
Huanuco Department	D	1	--------	--------	--------	[6] 1	--------
Tingo Maria	D	1	--------	--------	--------	[6] 1	--------
Junin Department	D	1	--------	--------	--------	--------	--------
San Ramon	D	1	--------	--------	--------	--------	--------
San Martin Department	D	2	--------	--------	--------	--------	--------
Juanjui	D	1	--------	--------	--------	--------	--------
Lamas	D	1	--------	--------	--------	--------	--------
Venezuela:							
Bolivar State	D	--------	--------	--------	[7] 2	--------	--------

[1] Suspected. [2] Includes suspected cases. [3] Imported. [4] Estimated number of cases reported in an outbreak in Asero Province Jan. 1-Mar. 14, 1950. [5] Outbreak in North and South Yungas Provinces. [6] Date of report, Oct. 28, 1950. [7] In jungle areas 124 miles apart. Exact localities not stated.

Case of Human Rabies in West Virginia

Dr. N. H. Dyer, State Director of Health of West Virginia, has reported a case of human rabies. The victim was a 4-year-old boy who was severely bitten about the face and head on July 7, 1950. Prophylactic treatment was given immediately, 16 doses being administered. First symptoms appeared on July 22, and death occurred two days later.

Diagnosis of rabies in the biting dog was confirmed by the State Hygienic Laboratory. Microscopic examination and animal inoculation of brain tissue in two laboratories confirmed the diagnosis of rabies in the boy.

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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TUBERCULOSIS CONTROL ISSUE NO. 58

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Bactericidal Effect of Surface-Active Agents

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
G. St. J. Perrot, Chief of Division

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Public Health Reports

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Community-Wide Chest X-ray Survey

II. Nursing

By Zella Bryant, R. N., M. P. H. and Genevieve S. Jones, R. N., B. S.*

When a community-wide chest X-ray survey begins, one of the first considerations is how to plan and provide for nursing service. This question is with the survey planners when the first estimate of the city's strengths and weaknesses in tuberculosis control is made, and the solutions that are found have to be such that they will carry through a long period of follow-up, perhaps a year after the last 70-mm. film has been taken by the Public Health Service units. In our participation in such surveys in 12 large cities,[1] experience has defined a number of common questions and suggested certain effective actions. Because no two cities in the United States have the same policies, or combination of facilities, however, it is necessary to write out broad specifications which could apply in any city of 100,000 or more people. Plans for nursing in each community-wide survey must be adapted to the needs of the particular area, to the facilities and personnel available, and to the established regulations and policies. But the nursing needs are basically alike everywhere, and so certain generalizations apply to any situation.

The emphasis in our discussion of nursing in a community-wide survey will be on public health nursing in the health department. The health department is one of the three vital sponsors of the survey. The director of nursing in the health department works with other nurses and agencies in the community in this undertaking.

The question which inevitably comes up when a survey is being planned is whether the existing nursing services can be stretched to meet the needs the survey will bring to light. People in local health

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[1] For a general description of such surveys see "Community-Wide Chest X-ray Survey—Introduction." Pub. Health Rep. 65: 1277-1291 (October 6) 1950.

This is the fifty-eighth of a series of special issues of Public Health Reports devoted exclusively to tuberculosis control. The special issues began March 1, 1946, and appear the first week of each month. The articles are reprinted as extracts. Effective with the July 5, 1946 issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 10 cents a single copy. Subscriptions are obtainable at $1.00 per year; $1.25 foreign.

departments have usually had experience with mass chest X-ray surveys conducted in schools, industries, or certain areas of their jurisdictions. They know what the nursing service demands are when thousands or even tens of thousands of X-rays are taken. In estimating the demands of a community-wide survey, however, they would be mistaken in assuming, on the basis of simple mathematics, that it requires 10 times as much nursing time if 100,000 people have small X-rays as it would if 10,000 people were X-rayed. In a number of ways, the survey operation saves nursing time and cuts down the total requirement.

1. The time of nurses in a survey is used entirely for nursing service, since they are relieved of tasks which under ordinary circumstances may cut into their professional time. They do not have the responsibility of getting the people to the X-ray unit for the first film. The survey organization is equipped to do this job, and the health educators take full responsibility for carrying it through. Furthermore, the survey organization is staffed with records personnel, including supervisors and clerks, who handle records and reports, notify patients, physicians, and clinics, and make appointments.

2. The dependable routine established in the survey organization moves with the efficiency of the assembly line, but paradoxically allows the nurse to give more individual attention where it is needed and under the best circumstances. In the normal order of events, the small films are read and notifications are mailed within 2 weeks after they are taken. Thus, people have not lost, by the time they receive the letter advising the second film, all of the original motivation which made them have the 70-mm. film. They are given specific appointments for the second film, and over 80 percent of them keep their appointments. Whatever the reason for this response, whether it is the impetus of the community-wide project or the fact of the definite appointment, it reduces excessive demands for home nursing visits during the survey. Referrals of patients from the retake center to physicians or clinics are also handled promptly so that public health nurses will need to use a minimum of time in checking to see whether physicians or clinics have received reports.

3. The thinking and planning back of the survey is cooperative and cuts across the boundaries of agencies and professions. Early planning looks at the tuberculosis problem in its entirety and seeks ways of coping with it more effectively. Through committees of the professional services division, professional workers (physicians, nurses, social workers, etc.) consider joint action of health and social agencies for improving service to tuberculosis patients and their families. They may work out better systems of interagency referrals and clarifications of the areas of responsibility of agencies and institutions to avoid duplication in nursing services.

4. The interest in tuberculosis which is created by the survey can be capitalized on by nursing. Primarily, it may result in actual increase of funds available for tuberculosis control. But even when that is not the case, there are other advantages. For example, the physicians in the community have been made keenly aware of tuberculosis and the health department's methods of controlling it, so that they understand what the public health nurse does and can give her the information about patients which she needs from them. The health and social agencies to which she may refer patients are more tuberculosis-conscious. The nursing profession, itself, through the nursing committee of the survey (see p. 1580), has had its interest in tuberculosis and the survey stimulated, and its knowledge about the disease and its control refreshed.

5. The nursing activities of the survey are carefully coordinated through the health department director of nurses and tuberculosis nursing consultants from the Public Health Service and the State and local health departments. Their functions will be discussed later in detail.

How Can Nursing Service Be Provided?

Most generalized public health nursing services are carrying a heavy case load under normal circumstances. Many hospitals are understaffed with nurses, and this may be true in tuberculosis sanatoria. It seems reasonable to say that sufficient facilities are seldom available to provide complete care for every tuberculosis patient. This problem is not created by a survey, but it is naturally revealed promptly by the number of persons needing care who are found by the community-wide undertaking. By carefully anticipating the sudden increase in services required, however, and by making adjustments in existing programs, the nursing directors and others responsible for nursing services in survey cities can plan for the best possible use of personnel and facilities.

We have found that the question of how nursing can be provided falls roughly into two sections: (1) What steps can the health department take to expand existing resources? (2) What determines the amount of nursing time that will be needed? It will be taken up, therefore, under these two headings, with full realization that there will be overlapping.

Steps to Expand Existing Nursing Resources

In planning for increasing the amount of nursing time available for tuberculosis during and following the survey, the health department has four possibilities to consider: temporary adjustments in health department programs to allow more time for tuberculosis; revision of policies which govern nursing practices; increased assistance from other agencies in the community which give nursing service; employment of additional nurses.

1. Since any adjustments which are made in health department programs affect other phases of the public health effort, it is important for the entire staff to be consulted and oriented to the immediate needs of this program. By looking ahead, other divisions are frequently able to alter their routine so that nursing time can be relinquished temporarily for the concentrated tuberculosis case-finding program. Some commitments are constant and cannot be interrupted. Others are not jeopardized by being put aside for a short period of time if plans are made well in advance. For example, in one city, the director of acute communicable disease control changed the schedule of immunization clinics so that they would be completed before the survey was begun. In preparation for another survey, classes for expectant mothers were begun, to cut down the number of prenatal home visits which otherwise would be required. Sometimes changes which are made to allow more nursing time for tuberculosis during the survey result in improvements in the whole program.

2. In the process of evaluation of the tuberculosis control program which is done in preparing for a survey and of the rules which are followed in selection of cases for clinic and field nursing supervision, the health department is often able to revise practices so that some types of cases can be dismissed. For instance, adult contacts of tuberculosis patients can be referred to the survey except in unusual circumstances.

In line with the new policies, analysis of the home nursing case load determines which cases can be dismissed or have visits at longer intervals, and which should have more frequent visits. Here, the judgment of the individual nurse is of great importance. The decision cannot be made entirely on the basis of the patient's physical status. Conditions in his home and his family's ability and inclination to assume responsibility must also enter into the consideration.

3. It is usual for nurses in the health department to have a close working relationship with the Visiting Nurse Association, the Board of Education nurses, and with other agencies which give public health nursing service. When the plan for a survey is taking shape, these agencies enter into the community preparations, and, frequently, they are able to contribute nursing services for the survey. School nurses have helped in some surveys by taking on the job of making home visits to people who fail to return to the retake center. Industrial nurses sometimes can give this kind of service as well. The Visiting Nurse Association sometimes agrees to care for all or selected tuberculosis patients found in the survey who need bedside care.

4. The addition of nurses to the staff to fill survey needs depends, of course, upon budget considerations. It is not always possible for health departments to obtain funds for this purpose, but in four cities additional permanent nursing positions have been approved during or following community-wide surveys. Public interest in the survey makes it easier for the authorities to obtain increased budgets. Occasionally an interested voluntary agency will pay the salaries of nurses for a period that will cover the special increase in nursing services needed as a result of the survey. The Hennepin County Tuberculosis Association paid the salaries of eight nurses who were assigned to the health department in Minneapolis for more than a year during and following the survey.

Determining the Amount of Nursing Time Needed

It is natural that the health officer and the director of nursing in a city where a survey is to be held would want to know in advance how much of an increase in nursing time the survey will make necessary. On the basis of previous experiences, we are able to predict with a fair degree of certainty the number of nurses who will be needed in the retake center and for how long a time. Let us take a city of about 150,000 people where we could expect to take 100,000 70-mm. films. Let us assume that the policy decided upon will be to recall to the retake center for 14″ x 17″ films all persons whose small films show evidence or suspected evidence of tuberculosis, cardiac abnormality, or other chest disease. We shall also assume that eighteen 70-mm. units will be in operation for 3½ weeks, and that the retake center will be in full operation 2 weeks after the beginning and remain open 3 weeks after the end of the 70-mm. operation, a total of 4½ weeks, or about 22 working days. An average interview takes 15 minutes and so a nurse can do 25 a day. On these assumptions, our estimate would be as follows:

a. 70-mm. films expected	100, 000
b. 14″ x 17″ films expected: 3.2 percent of a. (average recalls of previous surveys)	3, 200
c. 14″ x 17″ films per day: b÷22 days of operation	145
d. Nurses required for center: c÷25 appointments per day	6

Predicting the increase in nursing service that will be required in the health department chest clinic, in field nursing, and in the sanatorium cannot be done in any similar way, since there are a large number or variables to be considered. These variables are not only the available staff and physical facilities, but the local health department regulations and policies, and the practices decided upon by the sponsors of the survey. Listing some of them will perhaps serve as a guide to the type of thing that should be considered in planning for nursing service:

1. Staff and physical factors.

a. How many nurses are there in the generalized public health nursing service of the health department? On the Visiting Nurse Association staff, the school health service, and so forth?

b. What is the staffing pattern in the tuberculosis sanatorium?

c. What voluntary assistance can be called upon from nurses' aides, or from members of professional nursing organizations?

d. Does the health department operate a full-time chest clinic, or are certain days given over to tuberculosis in a general clinic? How many patients can the clinic serve in a day at its greatest capacity?

e. Is there a diagnostic clinic, or do survey plans include the establishment of one?

f. How large is the geographic area which field nurses must cover?

g. How many beds are available in the sanatorium, and is there any plan to open up new beds for survey patients?

2. Health department practices.

In the planning of a survey, the practices of the health department which have to do with tuberculosis are reviewed critically, and sometimes they are revised to provide for more efficient service in nursing as well as in other aspects of tuberculosis control. The established regulations continue in effect during the survey; diagnosed cases of tuberculosis must be reported to the health department and arrangements made for the isolation of those who may endanger the public health. If definite policies do not already exist as to what responsibility the health department will take for the isolation of open cases, these should be determined before the beginning of the survey. When definite rules exist for procedures like visits by a public health nurse to all patients diagnosed as having tuberculosis, they will still be followed unless changes are decided upon.

3. Medical and public health policies of the survey.

In the early conferences of survey sponsors, the health department and the medical society set up certain policies which have a great bearing not only on the number of nurses who will be needed, but upon the services they will give. It is exceedingly important for a nurse to have a part in this planning; the best situation is where the nursing consultant attends the medical policies committee meetings, so that she can know what plans are developed and also discuss with the committee their practicability in terms of the nursing service available. Some examples of the kind of questions on which policy is established are:

a. Will public health nursing services be made available to the patients of private physicians? If so, will such service be given routinely to all cases, or on request, or only to "open" cases?

b. Will patients be referred to private physicians after the 14" x

17″ X-ray or will it be routine to refer them after an examination for tuberculosis which includes laboratory diagnosis?

c. What priorities will be given in clinic and home supervision to: (1) persons who have been diagnosed as having tuberculosis; (2) persons whose X-rays suggest abnormal chest conditions and who are awaiting diagnosis; (3) contacts of tuberculosis patients; (4) patients who have been discharged from tuberculosis hospitals; (5) diagnosed cases and suspects who are not under medical supervision?

d. What responsibility will be taken for clinic and public health nursing supervision of persons who are found to have abnormalities of the chest other than suspected tuberculosis?

e. What special services will be given to persons whose 70-mm. films are interpreted as indicating urgent need for follow-up? Will nursing visits be used to bring such patients under immediate medical care?

f. When sanatorium beds are not available for all patients for whom hospitalization is recommended, what will be the basis for the selection of patients to go to the sanatorium? Since the service given in the home varies with the type of case, it is important in planning for nursing time to know what kind of case is to be given service.

g. Will clinic nurses be called upon to secure gastric specimens?

h. What will determine the dismissal of cases from the clinic?

i. What will be the procedure with regard to the supervision of contacts of tuberculosis patients?

j. To what extent will public health nursing visits be made to persons who fail to keep appointments at the retake center and/or the clinic?

The director of nurses and the tuberculosis nursing consultants must know what medical policies are made in order to plan in advance for the nursing service that will be required. If they also have a part in shaping policies, they can be of great assistance in interpreting the implications for nursing and in helping to make decisions which will insure the best possible nursing service with the available staff.

Direct Nursing Service in the Survey

Nurses have demonstrated their interest in surveys through participation, along with other citizens in the community, in the general organization. Professionally, they participate in the survey organization through the nursing committee, and in all fields of employment they give direct service to persons who are discovered by the survey. Nurses in most health agencies and institutions give more than the usual amount of time to tuberculosis during the survey and for some time after it is completed. Public health nurses in the health department continue to give service in the clinic and nursing supervision to patients in the home; they are directly in charge of the retake center which is a part of the survey operation.

We will describe the membership and functions of the nursing committee, the duties of the nursing consultants who work on survey problems, the operation of the retake center, and the implications of the survey for regular clinic and field nursing in the health department.

The Nursing Committee

Although it does not take direct responsibility for any of the nursing service which is given to persons who are X-rayed, the nursing committee of the survey gives valuable assistance to the enterprise in sharpening professional interest in tuberculosis and its control, and representing the profession in the survey organization. It is a part of the professional services division, one of the three major divisions of most survey organizations.[3]

In most cities, the nursing directors of agencies in the community—the health department, the Visiting Nurse Association, tuberculosis hospital, and so forth—make up the nucleus of the committee. In order to be fully effective, the committee should have representation from all areas of nursing: local professional organizations, hospitals (both tuberculosis and general), clinics, official and voluntary public health nursing agencies, industrial, school health service, doctor's office, general duty and private duty nursing, nursing education, and schools for practical nursing.

When the committee selects its chairman, the important qualifications to consider are a keen interest in community activities, a genuine desire to have the nursing profession carry its full share of the survey's work, and knowledge of public health nursing in the community. Since the chairman takes part in the deliberations of the professional services division, she should be a person who can contribute toward plans which will be realistic in terms of the community's nursing resources and can judge which matters should be brought to the attention of the health department director of nursing, who is responsible for nursing services to persons X-rayed in the survey.

Quite naturally, the role of the nursing committee varies in different cities, but usually its three major contributions are in helping to recruit nurses for tuberculosis hospitals and the health department, in arranging for the participation of nurses as citizens in the total survey effort, and in arousing the attention of nurses in all fields of employment to the community's tuberculosis problem and adding to or refreshing their knowledge about the disease and its control.

The content of educational programs also varies in communities, but usually it includes discussion of the epidemiology and newer methods of diagnosis and treatment of tuberculosis, the social, economic, and emotional problems and needs of tuberculosis patients and their families, and provisions for after care and rehabilitation. Specialists in the medical, nursing, and social work fields have made important contributions to the discussions.

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[3] The other two are the community participation and finance divisions.

The Public Health Service Consultant

It seems appropriate to make brief mention of the Public Health Service nursing consultant who participates with other members of the Public Health Service survey team in early planning and in the operation of the program. She serves as an advisor to the health department and other sponsoring agencies on the nursing phases of the program. She works closely with the medical-officer-in-charge of the Public Health Service survey team and with the medical committee when plans for follow-up are under consideration. In planning for increased nursing time for tuberculosis, she gives consultation to the director of nurses in the health department, and, from experience in previous surveys, she works with the survey and the health department in arranging the layout of the retake center, selecting its staff, developing procedures, and operating the center. The nursing committee can call upon her for advice in selecting a chairman and setting up a program. In some surveys, she remains in the community throughout the operation of the program while in others she makes only periodic visits.

The Local Tuberculosis Nursing Consultant

A number of the health departments in cities where community-wide surveys have been held have had full-time tuberculosis nursing consultants on the staff before the survey was planned. If the position has not already been set up and filled in the local health department, arrangements have been made for it for at least 6 months before and about a year following the 70-mm. film-taking operation. Sometimes one of the supervisors in the generalized nursing program has been assigned to this post; in other cities, either the State health department or the Public Health Service has lent to the city a tuberculosis nursing consultant, who becomes a member of the health department staff.

The local tuberculosis nursing consultant works with the director of nursing, the tuberculosis control officer, and others to plan and administer an effective tuberculosis nursing service. Because the accelerated case-finding program increases the need for tuberculosis nursing, the local consultant has intensive work to do in preparing the health department nurses for taking on the increased tuberculosis case load and in extending and improving nursing services for tuberculosis patients and their families.

When health department practices are reviewed with an eye to possible adjustments that will provide more nursing time for tuberculosis, the local consultant works with the nursing director, supervisors, and staff nurses in seeking ways to provide care for the number of new patients anticipated. The general organization of the retake center is in her charge. When the personnel needs of the center have been defined, and plans for the necessary assignments have been made, she and the Public Health Service consultant give the necessary orientation to nurses who are assigned to the center. She works with the survey staff in setting up record and referral systems which can be coordinated with those of the health department, and with both the survey and the health department staff in scheduling appointments at the health department chest clinic.

A health department nursing staff education program is usually undertaken when a survey is planned. Its objective is to acquaint the nurses with the survey aims, organization, and procedures, and to bring them up to date about tuberculosis case finding, treatment, and continuation care. The consultant works with the director of nurses and others in the health department in arranging this program.

In some health departments, special committees made up of nurses on the staff have studied the existing home and clinic nursing procedures and made suggestions for changes in line with recent developments brought out by the educational program. These committees sometimes develop methods that are better than those in use, and their contribution is of lasting value to the city's tuberculosis control program.

Nursing in the Retake Center

Before taking up the assignment of nurses to the center and their duties, we shall give some background to show the importance of the retake center in the survey and to describe how it operates.

When the 70-mm. films taken at the X-ray units placed throughout the city are read, the matching basic survey record cards are marked by the Public Health Service physicians with symbols indicating that the films are essentially negative or that they show evidence of suspected tuberculosis, cardiac abnormality, or other chest pathology. The cards are then sent to the survey records room where the return addressed portions of those marked negative are detached and mailed. The records staff sends letters to persons whose cards contain the symbols indicating that the films were suspicious of abnormality. These letters explain that a second X-ray is recommended and give specific appointments for X-rays at the retake center. In most cities, the medical committee establishes a policy governing the prompt referral to physicians or clinics of persons whose films indicate the need of immediate care. These "urgent" cases are usually brought to the attention of the supervising nurse in the retake center. She arranges for the earliest possible appointment at the retake center through telephone calls and/or home visits by health department nurses.

The retake center is centrally located in the city so that it will be convenient to as many people as possible. Although the survey organization usually does not have money to spend to make the center ideal in appearance, the space is carefully arranged. If separate rooms are not available, individual booths are constructed to give each patient privacy during the interview. There are also individual dressing cubicles which open directly into the X-ray room.

Volunteers act as hostesses in the retake center. They greet people who come to be X-rayed, direct them to the clerk-receptionist, introduce them by name to the interviewing nurses, later take them to the X-ray section, explaining how to prepare for the X-ray and assisting them if it is necessary. The clerk-receptionist keeps records, answers the telephone, types the lead-foil X-ray identification strips, checks appointments and rearranges them to suit people's convenience, and types second appointment letters. Because of these arrangements, the public health nurses' time is free for their primary responsibility of interviewing the people who come to be X-rayed.

We have found that the system of giving each person who is recalled to the retake center a definite appointment has several important advantages. It is undoubtedly one reason why so large a proportion of the people recalled for a second film respond. And it saves both time and confusion in the center, since long periods of waiting are avoided and the people are not subject to the discomfort of crowding. For most people, being advised to have a second X-ray is a disturbing experience, and for many, coming to the center is a first experience with "public health." If each interviewing nurse has only four appointments an hour, she can usually manage not to keep people waiting for many minutes, and there will be no crowding in the waiting room. In one survey, as many as 450 appointments were scheduled in a day, and yet there were seldom more than 7 or 8 persons waiting.

In most cities where surveys have been conducted, experienced public health nurses from the health department have been selected for interviewing at the retake center and an exceptionally well-qualified public health nurse has been assigned supervisor of the center. The assignment of nurses from the generalized public health nursing service of the health department to duty in the retake center is desirable for several reasons. Tuberculosis case finding and service to patients are health department functions, and nurses will continue to give care to persons who are found to have tuberculosis. Health department nurses are familiar with the health and welfare agencies in the city and can make appropriate referrals. There is advantage also to the health department, because many people who have previously known little or nothing about its program become acquainted with one of the services which it has to offer. The nurses add to their skill in interviewing which is useful in the continuing tuberculosis-control program as well as in other programs of the health department. We have recommended that nurses who are loaned or employed temporarily during the survey be assigned to one of the regular programs of the health department, since the duties in the retake center require a thorough knowledge of the health department and other local facilities. In some cities they have taken over the districts of public health nurses who are assigned to the retake center.

The taking of the 14″ x 17″ X-rays and the nursing interview in the retake center are the beginning of the follow-up process, and the impression made upon the person who comes in for these purposes may decide whether he will follow later recommendations. Persons who are recalled may need considerable explanation of the reasons for having a second X-ray and for further diagnostic study if it is required. Most of the people recalled have had no reason to think they might be ill, and their reaction may be either disbelief or great alarm. The content of the interview and the counseling at this point must, of course, be adapted to the individual needs. One of the primary purposes of the interview is to make tentative plans for further diagnostic study if it is needed and to encourage continuation through the total diagnostic process until a definite diagnosis is made. In each interview the nurse (1) explains the reasons for taking the second film; (2) gives information about how and when the report on the 14″ x 17″ films will be received; (3) explains that X-ray interpretation alone does not provide a diagnosis of tuberculosis; and (4) gives assurance of help in planning for care if the need arises.

The other purpose of the nursing interview in the retake center is to obtain certain information to be used in follow-up. On the survey epidemiological form, the nurse records such information as the person's present and past occupation, any history of recent illness, or of tuberculosis or contact with it, and significant information about the person which will help those responsible for subsequent care. For example, it is important for the physician to know that a person has spent some years working in the pottery industry, or that he has had pleurisy with effusion; and the field nurse should know that a patient who is found to have "open" tuberculosis has a baby at home who could be endangered by each additional day of exposure. At this time, the nurse also obtains the name of the physician to whom the report of the 14″ x 17″ X-ray is to be sent, or of the clinic if the person does not have a private physician.

The retake center is under the direct management of a public health nurse from the health department staff. She supervises the nurses and clerical personnel of the center, assigns them to various duties, sees to it that they have proper orientation and complete understanding of the records they use. She has the responsibility for carrying out the personnel policies of the health department, where nurses are concerned, and of the survey for other staff members. She must make sure that epidemiological forms are properly filled out. At the end of each day, she reviews the basic record cards of those who have failed appointments and allocates them for follow-up. She interviews people with special problems and occasionally makes referrals to the survey medical officer, the health department, and other health and social agencies or workers when such is indicated.

We are frequently asked why everyone who comes to have a 14″ x 17″ film is interviewed, since some of these films will be read as negative. Our answer to this is that all the people who come to the retake center are anxious and therefore need help at that point. We also believe that the nursing time used for counseling in the center is a good investment, since fewer home visits are required at a later date to help the patient to understand the need for medical care.

Health Department Nursing and the Survey

The nursing services that are given to survey patients in the health department chest clinic and in their homes by public health nurses are basically the same as those given to tuberculosis patients found in any other way. There is no need, therefore, to discuss them in detail. In the process of consultation with health departments in cities where surveys were to be held, however, we have found that there are certain points which require particular attention in planning for good nursing service for an increased number of patients.

The health department chest clinic, whether it is the existing one expanded to handle a rapidly increasing case load, or a special diagnostic clinic set up in connection with the survey, is an exceedingly important factor in a community-wide chest X-ray survey. The functions of public health nurses in the clinic should be carefully studied before the survey to make sure that nursing time is being used to the maximum benefit of patients. A review of duties often reveals that nurses are doing such work as charting laboratory reports, sending out notifications of appointments, and sorting X-ray films—duties which can be done by trained clerks.

In the clinic, as in the retake center, the scheduling of definite appointments for patients has been found to increase the efficiency of the clinic and to decrease the number of failed appointments. Because many patients found in the survey have had no symptoms of their illness, the nurse perhaps needs more than the usual amount of time for interviewing them on their first visit.

Methods of referring patients to the chest clinic from the retake center should be carefully worked out to insure prompt attention for the persons who are to have follow-up in the clinic. The steps usually agreed upon by the health department and the survey staff are as follows: The chest clinic provides the survey records department with information on the number of survey-referred cases the clinic can handle on given days. The records department schedules appointments and notifies each patient of what time he is expected at the clinic, telling him that if this time is not satisfactory to him, he can change it by calling the clinic. The list of each day's appointments, with the patient's epidemiological records and 14'' x 17'' films is sent to the chest clinic far enough in advance so that a check can be made against the case register and clinic records. In this way, any information the health department has on a patient can be added to the survey records before he comes to the clinic.

An adequate system of communicating information between the clinic and field nurses, hospitals, and other agencies which give care to patients is also very important to successful follow-up. If the patient is to receive the care and help he needs, the field nurse must know each patient's diagnosis, his sputum status and the results of other laboratory tests, the treatment he has received and is receiving, and recommendations for his care. On the other hand, the clinic staff must be told about home situations, particularly those which make it impossible for the patient to follow the doctor's orders. When a patient is hospitalized, a copy of his complete health department record must be sent to the hospital to provide for continuity in treatment.

As the public health nurse makes home visits during the survey, she has an opportunity to recommend X-rays for the whole family. Sometimes nurses have found that contacts who have previously neglected an examination will have long-overdue X-rays made while the survey is on. Old people who have been clinging to their belief that only young people have tuberculosis may have X-rays in order to enter into the community project.

Although efforts are made in connection with the survey—in the interviews at the retake center and clinic, and by telephone calls and letters—to eliminate the necessity for many home visits, there is no substitute for the public health nurse's visit to teach isolation procedures, to give skilled nursing care to the patient, and to show other members of his family how to care for him. The care of tuberculosis patients and the protection of their families are major public health problems. If there are not enough hospital beds, patients may receive treatment in the home, either following a short stay in the hospital, or without any hospitalization. Patients for whom bed rest has been recommended need help to understand and accept the restrictions of this important treatment. If home care is to be given to a larger than usual number of patients after a survey, there must be careful scrutiny of the field nursing service to eliminate unproductive activities and to insure full utilization of the staff for care of those patients whose need is greatest.

Although there have, of course, been variations in the programs of different cities where surveys have been conducted, it has been our experience that there are strong similarities in the problems of providing nursing care and in their solution. In all cities, it has been necessary to analyze carefully the nursing facilities of the area and to plan for efficient use of nursing time. We have been convinced that it is possible to provide for nursing in a survey and not exceed a reasonable budget, and that good individualized service can be given in a screening program with a relatively small nursing staff.

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The Bactericidal Effect of Surface-Active Agents on Tubercle Bacilli

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Because of their potential value, particularly to the field of hygiene, the development of surface-active agents in recent years (*1*) has attracted a great deal of attention. Extensive study has been made of the effects of these agents on bacteria (*2,3*) including some work on their activity against mycobacteria (*4,12*). Reports on the latter reveal that, although some of the surface-active agents are lethal for nonpathogenic acid-fast bacilli, they are effective against virulent tubercle bacilli only at relatively high concentrations or after long periods of exposure. The present study was undertaken to test a representative series of these compounds for disinfectant action against *Mycobacterium tuberculosis.*

Material and Method

Some 400 surface-active compounds, preparations, and mixtures were obtained from manufacturers in all parts of the country. Representative products were then selected for testing on the basis of chemical make-up.

The study was planned as follows: First, a simple test would be run, with no attempt to stop the antibacterial action of the compound by dilution. If near-complete suppression of growth occurred, further tests would be carried out to prove a true killing action. If there were no marked suppression of growth, the compound could not be considered disinfectant at that strength. Actually, it seemed likely that proteins, fats, and lecithin contained in the culture medium would stop the action of anionic and cationic compounds promptly at the moment of planting (*2, 13*).

One-tenth ml. of a suspension containing 0.001 mg. of tubercle bacilli was mixed with 10 ml. of a given dilution of the surface-active agent. The mixture was incubated at 20° C for 10 minutes, and a 0.1 ml. portion of the bacillus-disinfectant mixture was then planted on each of two tubes of culture medium. The number of developing colonies was compared with that in the controls, where the tubercle bacilli were exposed only to distilled water.

The suspension was prepared from a highly virulent human strain isolated in this laboratory and designated as number 88. Weighed

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amounts of moist growth 3- to 4-weeks old (on solid medium) were ground in 0.0125 percent NaOH. Serial dilutions were made after the larger clumps had settled out. The cultures were made on slants of buffered egg-potato-glycerol medium (Loewenstein-Jensen).

Where the product tested was a mixture, dilution was based on the surface-active agent which was presumed to be the active ingredient. Where the proportion of the active ingredient was unknown, dilution was based on the total mixture. The compounds or preparations were tested at dilutions of 1:100 and 1:1000. Those found to be insoluble in these concentrations were tested at saturation or at 1:10,000.

Thirty-eight controlled experiments were run, testing three to five preparations (6 to 10 dilutions) per experiment. In the first half of the series, five separate tests were run for each disinfectant dilution; in the second half, three tests were run. Six separate control tests were run in each experiment.

The results of these experiments, indicating the growth-preventing effect of each of the substances tested in terms of a percentage ($\frac{c-x}{c} \times 100$, where c=the mean number of colonies in the control tubes and x=the mean number in the experimental tubes) are presented in table 1. Statistical analysis indicates only whether the growth-preventing effect is significant. Since the data in table 1 were obtained from many separate experiments, growth-preventing effects for different compounds cannot be compared too closely.

In a second series of nine experiments, there was only one test per disinfectant dilution and two control tests per experiment (table 2). Statistical analysis was not possible.

Dilution Tests.

These were run on compounds giving complete or near-complete suppression of growth in the primary test. With one exception, the test organism was $H37R_v$.[1] One hundred times as much bacterial mass (0.1 mg.) in 0.1 ml. of suspension was mixed with 10 ml. of the disinfectant. After 10 minutes, 0.1 ml. of the mixture was in turn mixed with 10 ml. of water, giving a hundredfold dilution. One-tenth ml. amounts of the primary tubercle bacillus-disinfectant mixture were then seeded on two tubes of culture medium, and like amounts of the secondary dilution mixture were cultured and injected into animals. In the case of Armeen 14 D, tertiary dilution was carried out in the same manner, increasing the primary dilution by 10,000 times. Three to five tests were run for each compound dilution, and five control tests for each experiment.

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[1] Kindly provided by William Steenken, Jr., The Trudeau Foundation, Trudeau, N. Y.

Table 1. *Growth-preventing effect of surface-active agents (three to five tests per dilution)*

Surface-active agent (Trade name or designation) [a]	Composition [b]	Dilution of supposed active ingredient [c]	pH	Surface tension in dynes per cm.	Growth-preventing effect in percent [f]
	ANIONIC COMPOUNDS				
Nacconol LAL (24)		1:100 [d]	6.2	28.2	58
		1:1000 [d]	6.7	30.4	[g] 0
Hytergen BM (18)	Anionic modified alcohol sulfate	1:100 [d]	8.3	30.2	73
		1:1000 [d]	6.5	30.2	42
Victawet 35B (38)	A phosphorated alcohol	1:100	6.7	28.4	54
		1:1000	6.9	38.9	[g] 12
Victamine D (38)	Octadecylamine salt of esterified octadecylamidophosphoric acid.	1:100 [d]	5.7	29.3	100
		1:1000 [d]	6.8	30.4	79
Aerosol OT (3)	Sodium dioctyl sulfosuccinate	1:100	4.8	28.5	[g] 21
		1:1000	6.5	30.4	[g] 5
Aerosol 18 (3)	Disodium N-octadecylsulfosuccinamate	1:1000	7.8	41.8	[g] 0
		1:10,000	------	--------	[g] 3
	Sodium xylenesulfonate (43)	1:100 [d]	7.0	50.8	[g] 0
		1:1000	6.5	72.0	[g] 0
	Sodium alkylbenzenesulfonate (43)	1:100	6.8	32.8	[g] 6
		1:1000	6.5	32.7	[g] 0
Ultrawet 30-DS (6)	Sodium alkylbenzenesulfonate	1:100	6.5	32.3	52
		1:1000	6.3	31.0	35
Santomerse D (23)	Sodium decylbenzenesulfonate	1:100	7.0	34.2	[g] 38
			8.0		[g] 16
		1:1000	6.6	33.1	[g] 39
			8.0		[g] 0
Detergent 240 (5)	Sodium nonylnaphthalenesulfonate 40 percent; sodium sulfate 60 percent.	1:100	7.4	31.8	[g] 17
		1:1000	6.8	31.8	[g] 4
Nacconol NR (24)		1:100	6.5	31.4	70
		1:1000	6.6	32.8	[g] 36
Nacconol NRSF (24)		1:100	5.9	33.7	54
		1:1000	6.5	34.4	25
Alroterge (2)	Sodium nonylnaphthalenesulfonate 35 percent; inorganic salts 65 percent.	1:100 [d]	7.0	30.5	82
		1:1000	6.5	30.8	[g] 38
Soft soap, USP	Potassium salts of the fatty acids of cotton seed oil.	1:100 [d]	10.3	31.0	[g] 0
		1:1000 [d]	8.5	35.5	44
Hard soap	Sodium salts of fatty acids	1:100 [e]	10.2	28.6	45
		1:1000 [d]	10.3	30.8	[g] 15
Alrosene 31 (2)	Sodium N-lauroyl-2-aminoethyl sulfate 31 percent; inorganic salts and water 69 percent.	1:100 [d]	8.4	34.4	[g] 21
		1:1000 [d]	7.8	33.6	35
	Potassium N-stearoyl-2-aminoethyl sulfate 24 percent; potassium sulfate 16 percent; water 60 percent (39).	1:100 [d]	8.1	27.8	82
		1:1000 [d]	7.1	29.2	64
	N-(α-Alkylcinnamoyl)-2-aminoethylsulfonic acid (33).	1:100 [e]	2.9	29.4	45
		1:1000 [d]	3.8	33.4	88
	Sodium sulfobutyloleate 60 percent; NaOH amount unknown (5).	1:100	5.7	32.8	[g] 26
		1:1000	5.5	35.4	[g] 0
K Wood Rosin Soap (19).	Sodium salt of abietic acid and its isomers.	1:100	9.0	40.7	[g] 46
		1:1000	7.8	50.7	[g] 36
Vinsol Sodium (19)	Sodium salt of a complex resin containing phenolic hydroxyl and methoxyl groups and a carboxyl group.	1:100	8.3	44.7	[g] 4
		1:1000	7.3	47.4	[g] 17
Staybelite Sodium Soap (19).	Sodium salt of a hydrogenated rosin, mostly of dehydroabietic acid and tetrahydroabietic acid.	1:100	9.3	38.3	[g] 0
		1:1000	8.4	50.3	[g] 0
Sodium Soap of Resin 731-C (19).	Sodium salt of a dehydrogenated rosin which contains 55 percent dehydroabietic acid, dihydroabietic and tetrahydroabietic acids.	1:100	9.5	37.3	[g] 43
		1:1000	8.5	48.3	[g] 40
	CATIONIC COMPOUNDS '				
Thoral (35)	9-Octadecenyldimethylethylammonium bromide.	1:100	4.2	34.9	[g] 0
			8.1		[g] 0
		1:1000	6.6	35.9	[g] 0
			8.0		[g] 0
LAR 222 (35)	Alkyldimethyl-3,4-dichlorobenzylammonium chloride.	1:1000	7.2	34.9	[g] 25
		1:10,000	7.1	36.8	73
LAR 257 (35)	Alkyldimethylbenzylammonium chloride.	1:100	6.4	38.1	87
		1:1000	7.3	33.6	78
LAR 260 (35)	Cetyltrimethylammonium bromide	1:1000	7.0	37.9	[g] 30
		1:10,000	7.2	50.0	62
	Phenyl dimethylaminoethyl ketone methosulfate (21).	1:100	------	--------	100
		1:1000	------	--------	[g] 27
Zephiran (41)	Alkyldimethylbenzylammonium chloride.	1:100	7.1	36.8	49
		1:1000	7.0	34.8	46

See footnotes at end of table.

Table 1. *Growth-preventing effect of surface-active agents (three to five tests per dilution)*—Continued

Surface-active agent (Trade name or designation) [a]	Composition [b]	Dilution of supposed active ingredient [c]	pH	Surface tension in dynes per cm.	Growth-preventing effect in percent [f]
		CATIONIC COMPOUNDS—Continued			
Cationic UC-50 (6)		1:100	6.9	33.0	77
		1:1000	6.7	30.8	64
Deceresol SE (3)	Stearamidopropyldimethyl-2-hydroxyethylammonium chloride.	1:100	6.5	40.4	62
		1:1000	6.5	40.2	44
	Carbostearyloxymethylpyridinium bromide (33).	1:100	2.4	28.0	94
			8.2		60
		1:1000	3.4	30.4	60
			8.1		16
Emulsept E607 (13)	N-(Acylcolaminoformylmethyl)-pyridinium chloride.	1:100 [d]	3.7	31.7	34
		1:1000	4.4	31.4	19
	Tetradecyl bromide quaternary salt of nicotinamide (36).	sat. sol	6.7	38.2	23
		1:10,000	6.5	42.5	12
	N-tetradecyl-γ-picolinium chloride (36)	1:100	5.3	43.0	[g] 36
			8.0		[g] 9
		1:1000	6.4	44.0	[g] 22
			8.2		[g] 0
	Cetyl chloride quaternary salt of nikethamide (36).	1:100	3.7	41.6	59
			8.2		[g] 0
		1:1000	5.1	43.8	35
			8.2		[g] 0
	4-Tridecyl-*n*-allylpyridinium bromide (36.)	1:100	6.7	35.8	[g] 33
		1:1000	6.1	39.3	[g] 11
	Benzyl chloride quaternary salt of dodecylisonicotinamide (36).	sat. sol	6.7	40.8	[g] 35
		1:10,000	6.6	49.0	[g] 29
A-509-R (12)		1:100	7.3	35.9	83
			7.4	35.7	68
		1:1000	6.9	36.6	60
			6.9	36.4	59
	(1-Phenyldodecyl)-dimethylcinnamylammonium chloride (32).	1:100	6.5	39.2	86
		1:1000	6.5	41.5	[g] 0
		1:10,000	6.6	49.9	[g] 8
	(*p*-tert-Octylphenoxyethoxyethyl)-trimethylammonium chloride (28).	1:100	4.2	38.1	43
		1:1000	6.6	48.8	[g] 18
	(2,2,4,4,-Tetramethylbutylphenoxyethoxyethyl)-dimethyl benzylammonium chloride 5%; sodium tripolyphosphate and modified soda, amounts unknown (43).	sat. sol	9.0	34.6	96
		1:1000	9.6	37.6	65
Teramine (40)	(*p*-tert-Octylphenoxyethoxyethyl)-dimethylbenzylammonium chloride.	1:100	2.9	32.6	80
		1:1000	3.3	32.4	30
	2-Benzhydryloxyethyldimethyl-(carbo-2-ethylhexyloxymethyl)-ammonium chloride (28).	1:100	5.1	35.8	87
			8.0		64
		1:1000	5.3	35.0	[g] 26
			8.1		[g] 0
Timsen (31)	(Diisobutylphenoxyethoxyethyl)-dimethylbenzylammonium chloride 95 percent; NaCl 5 percent.	1:100	6.5	35.7	67
		1:1000	6.5	33.2	[g] 32
	(*p*-Diisobutylphenoxyethoxyethyl)-dimethylbenzylammonium chloride (20).	1:100	7.8	33.4	69
		1:1000	7.8	32.8	45
Dichloran (15)	Lauryldimethyl-3, 4-dichlorobenzylammonium chloride.	1:100	7.0	32.5	91
		1:1000	6.5	32.5	51
Cetol (15)	Cetyldimethylbenzylammonium chloride.	1:100	5.4	38.7	77
		1:1000	6.1	39.7	37
Catylon D (18)	Stearic acid complex amine condensate	1:100 [d]	5.9	36.0	72
		1:1000 [d]	5.2	39.7	54
LAR 265 (35)	A quaternary ammonium pentachlorophenate.	1:100 [d]	6.5	38.2	91
		1:1000 [d]	6.9	43.1	54
Hyamine 3258 (30)	Trimethyloctadecylammonium pentachlorophenate 87.5 percent; trimethyloctadecylammonium chloride 10.5 percent; NaCl 2 percent.	1:100 [d]	----	--------	100
		1:1000 [d]			95
		1:10,000 [d]			67
	Ceepryn sulfathiazole (37)	1:100 [d]	7.4	48.3	100
		1:1000 [d]	7.4	48.5	46
		sat. sol			[g] 0
	Cetamium sulfathiazole (37)	1:100 [d]	7.1	36.7	100
		1:1000 [d]	7.2	41.3	43
		sat. sol			32
	Ceepryn sulfapyridine (37)	1:100	8.5	39.9	63
		1:1000	8.0	41.6	52
	Diethylhexadecyl-2-hydroxyethylammonium chloride (21).	1:100	6.8	39.5	39
		1:1000	7.3	39.8	[g] 39
	β-Dibenzylaminoethanol methiodide (21)	sat. sol	7.4	62.5	53
		1:1000	7.3	64.3	[g] 41
	Benzyldiethyl-2-(heptadecylcarbamyloxy)-ethylammonium bromide (33).	1:100	5.6	29.5	96
		1:1000	7.8	29.5	56

See footnotes at end of table.

Table 1. *Growth-preventing effect of surface-active agents (three to five tests per dilution)*—Continued

Surface-active agent (Trade name or designation) [a]	Composition [b]	Dilution of supposed active ingredient [c]	pH	Surface tension in dynes per cm.	Growth-preventing effect in percent [f]
CATIONIC COMPOUNDS—Continued					
Hyamine 3258 (30)—Continued.	1-Octyl-8-hydroxyquinolinium bromide (21).	1:100	6.2	33.7	21
		1:1000	7.2	59.0	37
	Dimethyl-2-(2-hydroxyethoxy)-ethyloctadecylammonium chloride (21).	1:1000 [d]	4.2	38.6	100
			8.2		98
		1:100[d]	6.0	37.3	78
			8.1		84
Ctab (8)	Cetyltrimethylammonium bromide	sat. sol	5.9	35.9	57
		1:1000	6.3	38.9	[g] 11
	Cetyldiethyl-(2-hydroxyethyl)-ammonium chloride (27).	1:100	5.3	37.3	54
		1:1000	6.3	40.8	[g] 14
260 (27)	Cetyl-di-*n*-propyl-(2-hydroxyethyl)-ammonium chloride.	1:100	5.1	41.4	67
		1:1000	6.2	42.2	[g] 21
	Benzyldiethyl-2-(heptadecylcarbamyloxy)-ethylammonium chloride (33).	1:100 [d]	3.7	29.7	100
			8.0		43
		1:1000 [d]	4.4	30.2	72
			8.2		[g] 0
	N-(*α*-Hexylcinnamoyl)-2-aminoethyltriethylammonium bromide (33).	1:100	6.7	39.2	42
		1:1000	6.4	44.2	37
	N-(*α*-Decylcinnamoyl)-2-aminoethyltriethylammonium bromide (33).	1:100	4.7	34.7	62
		1:1000	6.1	37.2	[g] 11
	Tris-(2-hydroxyethyl)-2-(octadecylcarbamyloxy)-ethylammonium chloride (21).	1:100 [e]	3.1	34.8	99.9
			8.0		99.3
		1:1000 [d]	3.6	39.8	65
			8.1		[g] 28
	2-(*α*-decylcinnamoxy)-ethyltriethylammonium bromide (33).	1:100 [d]	4.4	31.6	70
		1:1000	4.2	33.0	[g] 7
	2-(*α*-decylcinnamoxy)-propyltriethylammonium bromide (33).	1:100	3.7	32.2	75
			8.0		42
		1:1000	4.2	33.2	[g] 13
			8.6		[g] 12
	Dodecylpyridinium chloride (33)	1:100	4.2	41.0	34
			8.5		[g]0
		1:1000	5.2	40.6	6
			8.1		[g] 0
	Hexadecyl-2-thenylammonium chloride (21).	sat. sol	7.2	42.7	[g] 0
			8.4		[g]22
		1/10 sat	6.3	42.3	[g]8
			8.0		[g]22
Arquad 2HT (4)	Dimethyl "ditallow" ammonium chloride 68 percent; isopropanol 29 percent; salt 2 percent; secondary amine hydrochloride 1 percent.	1:148	6.5	37.2	[g]0
		1:1480		32.8	[g]25
Arquad 2C (4)	Dimethyl "dicoco" ammonium chloride 60 percent; secondary amine hydrochloride 3.5 percent; NaCl 4.5 percent.	1:166	4.9	30.7	74
		1:1660		30.5	[g]26
Hyamine 1622 (30)	----------	1:100	6.7	35.5	45
			8.1		22
		1:1000	6.9	38.0	50
			8.1		[g]13
	N-Laurylbenzotriazole ethobromide (36)	1:100	------	--------	76
		1:1000	------	--------	67
Intracol caprylic (34)	A caprylic acid amide with multiple amino groups.	sat. sol	10.5	28.4	75
		1:1000	9.5	35.3	72
Armeen 14D (4)	Tetradecylamine 90 percent; dodecylamine 4 percent; hexadecylamine 4 percent; octadecenylamine 2 percent.	1:100[d]	10.3	37.6	100
		1:1000[d]	9.9	31.8	99.9
Amine 0 (2)	1-Hydroxyethyl-2-heptadecenylimidazoline.	1:100[d]	9.5	30.4	59
		1:1000[d]	7.5	31.4	47
Quaternary 0 (2)	1-Hydroxyethyl-2-heptadecenylimidazolinium chloride.	1:100	6.0	31.8	75
		1:1000	5.9	38.2	44
Armeen 18D (4)	Octadecylamine 93 percent; hexadecylamine 6 percent; octadecenylamine 1 percent.	1:1000	8.7	--------	92
		1:10,000	7.0	--------	[g] 51
	Tetraethylene pentamine (9)	1:100	4.0	42.6	41
			11.1		57
		1:1000	4.0	52.0	[g] 24
			10.7		[g] 12
Nopcogen 20–0 (25)	Aminoethylamide of oleic acid	1:100	10.3	31.2	61
		1:1000	9.4	33.0	[g] 0
Nopcogen 14–L (25)	Diethanolamide of lauric acid	1:100	9.4	30.2	94
		1:1000	9.1	30.7	37
Nopcogen 11–0 (25)	Monoethanolamide of oleic acid	sat. sol	4.1	--------	16
		1:1000			13

See footnotes at end of table.

Table 1. *Growth-preventing effect of surface-active agents (three to five tests per dilution)*—Continued

Surface-active agent (Trade name or designation) [z]	Composition [b]	Dilution of supposed active ingredient [v]	pH	Surface tension in dynes per cm.	Growth-preventing effect in per-cent
NONIONIC COMPOUNDS					
Tween 40 (7)	Sorbitan monopalmitate polyoxyalkylene derivative.	1:100 [d]	6.3	43.1	[g]0
		1:1000 [d]	6.9	44.2	[g]0
Hymotol 307 (18)	Fatty acid polyglycol condensate	1:100	5.1	33.9	70
		1:1000	6.4	36.1	46
Nonisol 310 (2)	Distearate of nonaethylene glycol	1:100 [d]	6.6	39.2	63
		1:1000	6.4	37.8	39
Hymolon K (18)	"Non-ionic liquid amine fatty acid condensate"	1:100 [d]	9.7	30.2	80
		1:1000 [d]	9.2	30.3	50
Nonionic NPE-10 (6)	Nonylphenoxydecaethylene glycol	1:100	6.8	32.4	62
		1:1000	6.4	33.4	41
Triton X-100 (30)	Alkylarylpolyether alcohol	1:10	-----	33.3	96
		1:100			85
		1:1000			25

[a] Number in parenthesis is key to source or name of supplier:

(1) Alox Corporation.
(2) Alrose Chemical Company.
(3) American Cyanamid Company.
(4) Armour and Company.
(5) Arnold, Hoffman & Company, Incorporated.
(6) The Atlantic Refining Company.
(7) Atlas Powder Company.
(8) J. T. Baker Chemical Company.
(9) Carbide and Carbon Chemicals Corporation.
(10) Commercial Solvents Corporation.
(11) E. I. du Pont de Nemours & Company.
(12) Emery Industries, Incorporated.
(13) The Emulsol Corporation.
(14) Falls Chemical Products Company.
(15) Fine Organics, Incorporated.
(16) General Dyestuff Corporation.
(17) Givaudan-Delawanna, Incorporated.
(18) The Hart Products Corporation.
(19) Hercules Powder Company.
(20) Hunt Manufacturing Company.
(21) The Lilly Research Laboratories.
(22) The William S. Merrell Company.
(23) Monsanto Chemical Company.
(24) National Aniline Division, Allied Chemical & Dye Corporation.
(25) Nopco Chemical Company.
(26) Onyx Oil & Chemical Company.
(27) Ortho Research Foundation.
(28) Parke, Davis & Company.
(29) Procter & Gamble.
(30) Rohm & Haas Company.
(31) Theo Ross Associates.
(32) Sharpe & Dohme, Incorporated.
(33) Division of Medicinal Chemistry, The Squibb Institute for Medical Research
(34) Synthetic Chemicals, Incorporated.
(35) Turco Products, Incorporated.
(36) The Upjohn Company.
(37) Vick Chemical Company.
(38) Victor Chemical Works.
(39) Warwick Chemical Company.
(40) West Disinfecting Company.
(41) Winthrop-Stearns, Incorporated.
(42) Jacques Wolfe & Company.
(43) Wyandotte Chemicals Corporation.

[b] As reported by supplier. The supposed active ingredient is listed first.

[c] Where the proportions of the ingredients are unknown, dilution is based on the total mixture.

[d] Fine suspension, or solution not clear.

[e] Gelatinous.

[f] $\frac{c-x}{c} \times 100$, where c=mean number of colonies in the control, and x=mean number in the experimental tubes. Killing effects cannot be compared too closely since they were determined from many separate experiments, and since there is considerable possible variation in these figures.

[g] Not statistically significant.

Guinea Pig Inoculation.

In addition to culture, animal inoculation was used as a test of viability and virulence in a few cases. Injection was done subcutaneously and the animals autopsied 2 months after inoculation. $H37R_v$ was used as the test organism.

Results

One hundred and forty-two representative surface-active preparations were investigated, 90 by multiple tests (table 1) and 52 by single tests (table 2). Of the compounds tested, 44 were anionic, 91 cationic, and 7 nonionic. While many of these preparations showed significant growth-preventing action, especially in 1:100 dilution, few were sufficiently potent to warrant further investigation.

Table 2. *Growth-preventing effect of surface-active agents* (*one test per dilution*)

Chemical type of supposed active ingredient	Surface-active agent (trade name or designation)[a]	Growth-preventing effect [b]	
		Dilution [c]	
		1 : 100	1 : 1000
	ANIONIC COMPOUNDS		
Salts of alkyl sulfonates	Mixture (43 [d])	+	+
	Sodium alkylsulfonate (11)	+	+
Salts of alcohol sulfates	Dreft (29)	++	+
Salts of phosphoric acid esters	Victawet 12 (38)	++	+
	Victawet 1160 (38)	++	+
	Victawet 58 B (38)	+	+
Salts of alkyl aryl sulfonates	Mixture (43)	+	+
	Mixture (43)	+	+
	Sodium alkylarylsulfonate (16)	+	+
	Sodium isobutylnaphthalenesulfonate (16)	+	+
	Facid (13)	+	+
	Tensol 5Z (34)	++	+
Salts of fatty acid amide sulfonates or sulfates.	Mixture (16) [d]	+	+
	Oratol L-48 #3412 (42)	+	+
Salts of fatty acid ester sulfonates	Mixture (16) [d]	+	+
Oxygenated hydrocarbons	Alox 100 (1) (sat. sol.)	-------	+
	Alox 600 (1) (sat. sol.)	-------	+
	Alox 828 (1) (sat. sol.)	-------	++++
	Alox 125 (1) (sat. sol.)	-------	++
	CATIONIC COMPOUNDS		
Quaternary amine, salts	Alkyldimethylbenzylammonium chloride (16)	+	+
	RO-A (41)	+	+
	Benzylphenyldimethylammonium chloride (21)	+	+
	β-Dibenzylaminoethanol methiodide (21)	+	+
	Ceepryn (22)	+	+
	Tetradecylpyridinium chloride (36)	+	+
	MPO-1045, product BC (11)	+	+
	Carbotetradecyloxymethylpyridinium bromide (7)	+	+
	Mixture (16)	+	+
	(*p*-tert-Octylphenoxyethoxyethyl)-morpholine hydrochloride (28).	+	+
	Ethyl-*n*-hexadecyl-2-ketomorpholinium bromide (28).	+	+
	(β-benzhydryloxyethyl)-dimethyl-*n*-octylammonium bromide (28).	++	+
	(β-benzhydryloxyethyl)-dimethyl-*n*-nonylammonium bromide (28).	++	+
	(β-benzhydryloxyethyl)-dimethyl-*n*-decylammonium bromide (30).	++	+
	RO-C (41)	++	+
	Hydrofect (40)	++	+
	(*p*-tert-Octylphenoxyethyl)-dimethylcinnamylammonium chloride (28).	++	+
	Trimethyl-(3-dodecyloxymethyl-4-methylphenyl)-ammonium methyl sulfate (17).	++	+
	LAR 262 (35) (fine susp.)	++	+
	Carbotetradecyloxymethylpyridinium chloride (33)	++	+
	Ethyl bromide quaternary salt of N-tetradecylbenztriazole (36).	++	+
	Tetrosan 60 percent (26)	+++	+
	(1-Benzyldodecyl)-benzyldimethylammonium chloride (32).	+++	+
Alkanol amines or their fatty acid esters.	Intracol O (34)	+	+
	Intracol R (34)	+	+
	Intracol caproic (34)	+	+
Thiouronium salts	Triglycoldithiouronium dihydrochloride (28)	+	+
	Benzhydrylisothiourea hydrobromide (fine susp. at 1 : 100) (28).	+	+
	p-tert-Octylphenoxyethoxyethylisothiourea hydrochloride (fine susp. at 1 : 100) (28).	+	+
	Octylthiouronium chloride (28)	++	+
	p-Nitrobenzylisothiourea hydrochloride (28)	+++	+
	NONIONIC COMPOUNDS		
Fatty acid esters	G-1226 (7)	+	+
Polyether alcohols	Triton X-30 (30)	+	+

[a] Numbers in parentheses refer to name of supplier (see table 1 footnote [a]). [b] + = slight or none (0 to 50 percent growth prevention). ++ = partial (51 to 89 percent growth prevention). +++ = marked (90 to 99 percent growth prevention). ++++ = complete (100 percent growth prevention). [c] In mixtures, dilutions are based on supposed active ingredients. [d] Dilution based on total mixture, since proportion of active ingredient was unknown.

Only 10 preparations, 2 of them anionic and the rest cationic, caused complete or near-complete growth prevention at dilutions of 1:100 or higher: Victamine D, Hyamine 3258, Ceepryn sulfathiazole, Cetamium sulfathiazole, dimethyl-2-(2-hydroxyethoxy)-ethyloctadecylammonium chloride, benzyldiethyl-2-(heptadecylcarbamyloxy)-ethylammonium chloride, tris-(2-hydroxyethyl)-2-(octadecylcarbamyloxy)-ethylammonium chloride, Armeen 14D, phenyl dimethylaminoethyl ketone methosulfate, and Alox 828. Solutions of the first eight of these were not clear. Most of them, however, were very fine dispersions that required several days to separate; some were also gelatinous. Ceepryn sulfathiazole and Cetamium sulfathiazole, which at dilutions of 1:100 were fine suspensions that quickly settled out, showed relatively little suppressive action when in saturated solution. Of the remaining eight preparations, seven were re-examined by means of the *dilution* test, the results of which are shown in table 3. To reduce turbidity, Victamine D, Hyamine 3258, tris-(2-hydroxyethyl)-2-(octadecylcarbamyloxy)-ethylammonium chloride, and dimethyl-2-(2-hydroxyethoxy)-ethyloctadecylammonium chloride were tested at primary dilutions of 1: 200. Armeen 14D was brought into clear solution by means of isopropyl alcohol, 9 parts, and Triton X-100, 10 parts. The growth-preventing effect after secondary dilution drops markedly for all but Alox 828 and Armeen 14D. Animal inoculation substantiates the cultural findings.

One of the two most active preparations, Alox 828, caused complete prevention of growth in saturated solution, a dilution greater than 1:1000. This preparation, a highly insoluble, oily liquid, is reported by the manufacturer to be "the oxidation product of low molecular weight hydrocarbons," and we have classified it as anionic although its exact composition is unfortunately not known. Its high antitubercle bacillus activity was twice substantiated by guinea pig inoculation, and its effectiveness was not diminished by secondary dilution.

When Alox 828 was brought into solution with 9 parts of isopropyl alcohol and 8 parts of Triton X-100, however, its activity was greatly reduced. Thus, at a dilution of 1:1000, it had no significant effect, and at 1:100 there was not quite complete- (99 percent) growth prevention.

The other apparently potent preparation, Armeen 14D (principally tetradecylamine), a white, waxy substance that is cationic in nature, caused complete-growth prevention at a dilution of 1:100 and almost complete at 1:1000. Solutions in water are not clear. When brought into clear solution with 9 parts of isopropyl alcohol and 10 parts of Triton X-100, complete-growth suppression was obtained at a dilution of 1:1000. Its activity was not diminished by secondary and even

Table 3. *Dilution tests (Alteration of growth-preventing effect by secondary dilution)*

Surface-active agent (trade name or designation) [a]	Primary 10-minute exposure		Seconday dilution		
	Dilution of preparation [b]	Growth-preventing effect in percent	Dilution of preparation	Growth-preventing effect in percent	Guinea pig inoculation
Alox 828 (1)	Sat. sol.> 1:1000 1:10,000	[d] 100 0	>1:100,000 1:1,000,000	100 0	
Victamine D (38)	1:200 [b]	99.2	1:20,000	14	Positive.
Hyamine 3258 (30)	1:200 [b]	99.97	1:20,000	72	Do.
Tris-(2-hydroxyethyl)-2-(octadecylcarbamyloxy)-ethylammonium chloride (21).	1:200 [b] [c]	99.5	1:20,000	40	Do.
Phenyldimethylaminoethylketone methosulfate (21).	1:100	99	1:10,000	27	Do.
Dimethyl-2-(2-hydroxyethoxy-ethyl-octadecylammonium chloride (21).	1:200 [b]	99.98	1:20,000	67	Do.
Armeen 14D (4) in 9 parts of isopropyl alcohol and 10 parts of Triton X-100 (30).	1:100	100	1:10,000	[e] 100	Negative (tertiary dilution).
	1:1000	100	1:100,000	[e] 100	Do.

[a] Numbers in parentheses are key to name of supplier (see table 1 footnote [a]).

[b] Fine suspension or solution not clear.

[c] Gelatinous.

[d] Guinea pig inoculation negative.

[e] Tertiary dilution to 1:1,000,000 and 1:10,000,000 did not alter the 100 percent growth-preventing effect as evidenced by negative culture and guinea pig inoculation.

tertiary dilution to 1:10,000,000 as tested by both culture and animal inoculation (table 3).

A related preparation, Armeen 18D (principally octadecylamine) that caused 92 percent growth prevention at a dilution of 1:1000 was not investigated further.

The effect of raising the pH of the solution (to about 8) was tested in 14 preparations, 13 of which were cationic (table 1). There was either a diminution of activity against the tubercle bacillus (10 preparations) or no significant change (4 preparations). There was never an increase in activity.

While there seems to be a general tendency for the activity of the preparations to increase as the surface tension diminishes, this is by no means uniform. Whereas some of the less effective preparations have relatively low surface tension (e. g., Aerosol O. T.), one of the most active compounds, tetradecylamine, has the relatively high surface tension of 37.6 dynes per cm. at a dilution of 1:100.

There is little that can be said about the effect of chemical structure. In general, the anionic compounds are somewhat less active than the cationic, although the variation is great.

The following compounds were also tested by animal inoculation and found to be inadequate disinfectants at dilutions of 1:100: Zephiran, carbostearyloxymethylpyridinium bromide, Ctab, cetyl-di-*n*-propyl (2-hydroxyethyl)-ammonium chloride, and Aerosol 18. The usual 10-minute test was performed and the animals in each case developed tuberculosis.

Discussion

The growth-preventing effects of surface-active agents (tables 1 and 2) may represent the results of an immediate kill taking place in the 10-minute exposure period, or an action persisting after culture. Any persistent action may be bactericidal or bacteriostatic. That the culture medium does not always inactivate the reagent is indicated by the secondary dilution procedure which sometimes resulted in an appreciably diminished growth-preventing effect.

It will be noted (tables 1 and 2) that there are a few inconsistencies. For example, a higher growth-preventing effect is occasionally indicated for the higher dilution, but the differences are not statistically significant in most instances.

Moreover, the antibacterial action of a compound will not necessarily be predictable and uniform where true solutions are not obtained. Solid material that may be irregularly present in samples may interfere with disinfectant action or cause persistent action after culture. This may serve to explain inconsistencies noted with soft soap, Alrosene 31, and N–(α-alkylcinnamoyl)-2-aminoethylsulfonic acid, where the solutions were not clear. It does not, however, explain those found with LAR 222, cetyltrimethylammonium bromide and 1-octyl-8-hydroxyquinolinium bromide.

Most of the results, however, are consistent in demonstrating that the growth-preventing effects of these surface-active agents are relatively low for tubercle bacilli. High bactericidal activity, sufficient for practical disinfection, is missing, except in rate instances. While longer periods of exposure might in some cases result in complete killing, it seems unlikely that this would be true in sufficiently high dilution to provide economically practical disinfection.

Among the compounds tested are many that appear to be extraordinarily active against pathogens other than tubercle bacilli, especially the quaternary amine salts (*3*). Despite the fact that many of these agents are now widely recommended and used in disinfection and sanitation (*14*, *15*, *16*), they cannot be counted upon to kill tubercle bacilli. The lack of satisfactory disinfectant action by such well-known preparations as Emulsept, Ceepryn, Phemerol, soap, Dreft and alkyldimethylbenzylammonium chlorides (of which 3 different brands were tested), is especially disappointing. In the case of Armeen 14D, study has not yet been sufficient to show whether it can be recommended for practical disinfection.

Although the reasons for the relative ineffectivness of surface-active agents against tubercle bacilli are obscure, there is evidence that the phospholipids interfere with the anti-bacterial action of anionic and cationic compounds (*17*). Since the tubercle bacillus is rich in these substances, it may be naturally protected against the surface-active agents.

Summary

1. One hundred and forty-two representative surface-active agents' including the anionic, cationic, and nonionic groups, were tested for bactericidal action against tubercle bacilli.

2. One preparation, Armeen 14D, showed sufficient activity to be considered for practical disinfection. Its precise usefulness, however, awaits further study.

3. As a group, the surface-active agents are not good disinfectants against the tubercle bacillus. This applies even to the quaternary ammonium salts, which are now in widespread use in disinfection and sanitation.

Addendum

The authors wish to note some observations on two points which are related to the subject matter of this study: The effects of some common disinfectants on the tubercle bacillus, and the effects of some of the compounds examined in this study on pathogens other than tubercle bacilli.

Common Disinfectants and the Tubercle Bacillus

In the course of this study, the authors tested a series of phenolic compounds, using the same techniques. Compound cresol solution (USP) gave 100-percent suppression of growth at a dilution of 1:100, and only 28 percent at a dilution of 1:200. Amphyl (containing p. tert. amylphenol) maintained the complete growth-supressing effect it had at 1:100 even after extensive further dilution. A series of pine oils and their fractions were quite potent.

Previously, ethyl and isopropyl alcohols in several strengths were found to be highly disinfectant (*18*).

Formaldehyde, mercury oxycyanide, metaphen, and mercury bichloride were also tested by this method: mercury bichloride proved to be highly potent, giving complete killing at a dilution of 1:1000, while formaldehyde was completely effective at 4 percent. Mercury oxycyanide, 1:1000, failed to suppress growth after a contact period of 6 hours, and metaphen, 1:500, failed in 2 hours.

In addition, the authors have exposed positive sputum films (dried) to several of these surface-active agents for a period of 10 minutes, using the same technique as in the alcohol study (*18*). Complete suppression of growth was not obtained in the case of 2 brands of alkyldimethylbenzylammonium chloride, Hyamine 1622, Urolocide, and Ceopryn (all well-known quaternary ammonium compounds).

The prolonged action of dried films of surface-active agents on tubercle bacilli was also tested. Cover slips were dipped in 1 percent solutions and allowed to dry, after which a loopful of tubercle bacillus suspension was deposited on the surface and recovery made after 24 hours' exposure. There was only partial suppression of growth by several quaternary ammonium compounds.

Surface-Active Agents and Other Pathogens

Alkyldimethylbenzylammonium chloride (Zephiran, Winthrop-Stearns, Inc.), cetyltrimethylammonium bromide (Ctab, J. T. Baker Chemical Co.), and (*p*-diisobutylphenoxyethoxyethyl) dimethylbenzylammonium chloride (Hyamine 1622, Rohm & Haas Co.) were tested in dilutions of 1: 1000 and 1: 10,000 against *Staphylococcus aureus* and *Escherichia coli*, using the same technique as that employed against tubercle bacilli. The suspensions were prepared from fresh cultures growing on nutrient agar. Three separate tests using two culture tubes each were carried out for each microorganism and for each dilution of the several antiseptics. The test culture medium was the same Loewenstein's buffered egg-potato-glyceral medium used for the culture of tubercle bacilli, except that malachite green was omitted. There was complete suppression of growth by all three compounds at both dilutions, while the control tubes showed abundant growths.

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Incidence of Disease

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

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UNITED STATES

Reports From States for Week Ended November 11, 1950

Whooping Cough

Although the week ended November 11 is near the seasonal low week for whooping cough, more new cases of this disease were reported than any other of the common diseases of childhood. A total of 1,780 cases was reported as compared with 1,504 for the same week in 1949, and the 5-year median was 1,863 cases. The cumulative total since the seasonal low week, which falls between September 27 and October 3, is 9,374 as compared with 8,657 for 1949. The cumulative total for the "disease" year 1949–50 which ended September 30 was 118,731 which is more than double the total for the previous year

Comparative Data for Cases of Specified Reportable Diseases: United States

Numbers after diseases are International List numbers, 1948 revision]

Disease	Total for week ended—		5-year median 1945–49	Seasonal low week	Cumulative total since seasonal low week		5-year median 1944–45 through 1948–49	Cumulative total for calendar year		5-year median 1945–49
	Nov. 11, 1950	Nov. 12, 1949			1949–50	1948–49		1950	1949	
Anthrax (062)	------	------	(1)	(1)	(1)	(1)	(1)	40	45	(1)
Diphtheria (055)	126	241	344	27th	2,003	2,916	3,856	5,131	6,684	10,153
Acute infectious encephalitis (082)	16	9	12	(1)	(1)	(1)	(1)	857	687	574
Influenza (480–483)	1,900	1,658	1,834	30th	18,214	14,121	14,916	264,473	89,988	158,091
Measles (085)	1,661	777	1,544	35th	[2] 8,811	6,054	8,562	[2] 296,982	594,572	565,154
Meningococcal meningitis (057.0)	74	50	58	37th	482	451	451	3,281	2,967	3,021
Pneumonia (490–493)	1,037	1,001	-------	(1)	(1)	(1)	(1)	70,958	67,115	-------
Acute poliomyelitis (080)	902	749	490	11th	28,685	38,857	22,964	29,816	39,770	23,431
Rocky Mountain spotted fever (104)	1	2	3	(1)	(1)	(1)	(1)	446	553	541
Scarlet fever (050)	996	1,003	1,405	32d	7,203	7,571	9,912	47,373	65,237	71,388
Smallpox (084)	------	1	1	35th	3	4	6	29	45	153
Tularemia (059)	6	8	8	(1)	(1)	(1)	(1)	784	979	831
Typhoid and paratyphoid fever (040, 041) [3]	50	45	69	11th	[4] 2,591	3,041	3,041	[4] 3,100	3,529	3,529
Whooping cough (056)	1,780	1,504	1,863	39th	9,374	8,657	9,788	106,569	55,259	85,663

[1] Not computed.
[2] Addition: Wisconsin, week ended November 4, 30 cases.
[3] Including cases reported as salmonellosis.
[4] Deduction: Maine, week ended September 23, 1 case.

when 56,635 cases were reported. Estimated mortality rates based on a 10-percent sample of deaths for the first 8 months of 1950 was 0.8 per 100,000 population which was 60 percent higher than that for a similar period in 1949.

Other Diseases

The number of cases of poliomyelitis for the current week was 902, which was 17 percent lower than for the previous week. The total since the seasonal low week is 28,685 as compared with 38,857 for last year. Seventy-four cases of meningococcal meningitis were reported, as compared with 50 for the same week in 1949, and 58 for the 5-year median. There were no cases of smallpox reported.

Report of Outbreak of Encephalitis

It has been reported to the Communicable Disease Center in Atlanta that an encephalitis-like disease of horses occurred recently in Harrison and Hancock Counties, Miss., starting on September 26, 1950, and ending about October 20. At least 21 cases in horses are known to have occurred.

Confirmation of type of disease by laboratory examination could not be obtained. Investigators were of the opinion that the disease was Eastern Equine Encephalitis, despite the unusually late appearance of the disease. Mosquitoes were very abundant and the weather was extremely warm at the time of the outbreak.

At about the same period, several human cases with encephalitis-like symptoms were noted by local physicians, but the exact cause of the illness in man was not established.

Deaths During Week Ended November 11, 1950

Data for 93 large cities of the United States:	*Week ended Nov. 11, 1950*	*Corresponding week, 1949*
Total deaths	8,760	8,449
Median for 3 prior years	8,536	----------
Total deaths, first 45 weeks of year	410,484	410,036
Deaths under 1 year of age	685	616
Median for 3 prior years	619	----------
Deaths under 1 year of age, first 45 weeks of year	27,817	29,152
Data from industrial insurance companies:		
Policies in force	69,639,517	70,056,330
Number of death claims	11,391	7,798
Death claims per 1,000 policies in force, annual rate	8.5	5.8
Death claims per 1,000 policies, first 45 weeks of year, annual rate	9.2	9.1

Reported Cases of Selected Communicable Diseases: United States, Week Ended Nov. 11, 1950

[Numbers under diseases are International List numbers, 1948 revision]

Area	Diphtheria (055)	Encephalitis, infectious (082)	Influenza (480–483)	Measles (085)	Meningitis, meningococcal (057.0)	Pneumonia (490–493)	Poliomyelitis (080)
United States	**126**	**16**	**1,900**	**1,661**	**74**	**1,037**	**902**
New England	**1**		**3**	**45**	**1**	**44**	**33**
Maine						9	2
New Hampshire			2				2
Vermont				1			
Massachusetts	1			36	1		12
Rhode Island				5			1
Connecticut			1	3		35	16
Middle Atlantic	**5**	**1**	**7**	**475**	**17**	**284**	**184**
New York	5	1	[1] 4	163	7	193	107
New Jersey			3	77	1	40	29
Pennsylvania				235	9	51	48
East North Central	**10**	**4**	**20**	**397**	**20**	**115**	**254**
Ohio	4		1	94	3		65
Indiana	3	1	18	5	2	25	31
Illinois	1		1	75	7	39	50
Michigan	1	3		45	7	35	64
Wisconsin	1			178	1	16	44
West North Central	**7**	**1**		**123**	**5**	**73**	**82**
Minnesota	4			6	2	4	13
Iowa				5		2	21
Missouri	3			81	2	9	14
North Dakota				21		40	1
South Dakota				1			4
Nebraska				2			11
Kansas		1		7	1	18	18
South Atlantic	**39**		**367**	**100**	**9**	**109**	**112**
Delaware							1
Maryland				1		17	7
District of Columbia				2		16	5
Virginia	2		304	42	3	43	28
West Virginia	4		44	24		5	9
North Carolina	16			14	3		14
South Carolina	5		13	8	1	5	5
Georgia	12		6	6		8	32
Florida				3	2	15	11
East South Central	**31**	**1**	**23**	**44**	**9**	**41**	**39**
Kentucky	9			25	1	13	6
Tennessee	8	1	16	12	5		13
Alabama	13		5	3	1	14	3
Mississippi	1		2	4	2	14	17
West South Central	**27**		**1,344**	**95**	**7**	**282**	**64**
Arkansas	2		85	10		22	4
Louisiana	1		2	2	1	26	10
Oklahoma	2		35	7	1	25	9
Texas	22		1,222	76	5	209	41
Mountain	**5**		**128**	**117**	**2**	**44**	**21**
Montana	1		15	7			3
Idaho			18	5		10	4
Wyoming	1			3			
Colorado	1		21	77	1	16	6
New Mexico				13		4	3
Arizona	2		72	4	1	13	5
Utah			2	8		1	
Nevada							
Pacific	**1**	**9**	**8**	**265**	**4**	**45**	**113**
Washington			1	82		1	23
Oregon			4	13	2	8	28
California	1	9	3	170	2	36	62
Alaska							2
Hawaii			32	3			

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[1] New York City only.

Reported Cases of Selected Communicable Diseases: United States, Week Ended Nov. 11, 1950—Continued

[Numbers under diseases are International List numbers, 1948 revision]

Area	Rocky Mountain spotted fever (104)	Scarlet fever (050)	Smallpox (084)	Tularemia (059)	Typhoid and paratyphoid fever [1] (040, 041)	Whooping cough (056)	Rabies in animals
United States	1	996		6	50	1,780	101
New England		89			3	273	
Maine		11			2	39	
New Hampshire		2					
Vermont						17	
Massachusetts		72			1	128	
Rhode Island						32	
Connecticut		4				57	
Middle Atlantic		139			11	315	33
New York		[2] 55			5	105	27
New Jersey		23			1	111	
Pennsylvania		61			5	99	6
East North Central		208		3	6	438	4
Ohio		81			5	84	3
Indiana		15		1	1	81	
Illinois		28		2		39	
Michigan		57				96	1
Wisconsin		27				133	
West North Central		48			4	118	3
Minnesota		7				20	1
Iowa		8				14	2
Missouri		8			2	27	
North Dakota					1	5	
South Dakota						1	
Nebraska		8				14	
Kansas		17			1	37	
South Atlantic		168		1	5	163	13
Delaware		2				2	
Maryland		11				12	
District of Columbia		2				9	
Virginia		33				70	3
West Virginia		16			2	21	
North Carolina		65		1	2	29	
South Carolina		13				6	5
Georgia		23			1	11	4
Florida		3				3	1
East South Central	1	121			9	74	21
Kentucky		34			2	40	14
Tennessee		62			4	30	4
Alabama		20			1	3	3
Mississippi	1	5			2	1	
West South Central		52		1	6	167	27
Arkansas		7		1	1	13	
Louisiana		7				18	
Oklahoma		11			2	5	
Texas		27			3	131	27
Mountain		32		1	2	166	
Montana		7				31	
Idaho		4				9	
Wyoming		1				1	
Colorado		10				14	
New Mexico		1			2	2	
Arizona		4				64	
Utah		5		1		45	
Nevada							
Pacific		139			4	71	
Washington		43				10	
Oregon		14				9	
California		82			4	52	
Alaska						4	
Hawaii							

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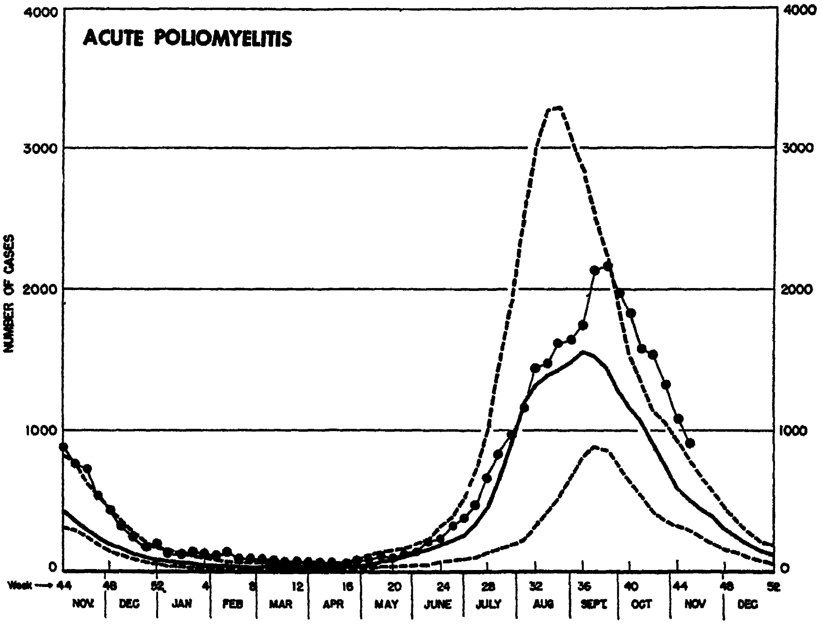
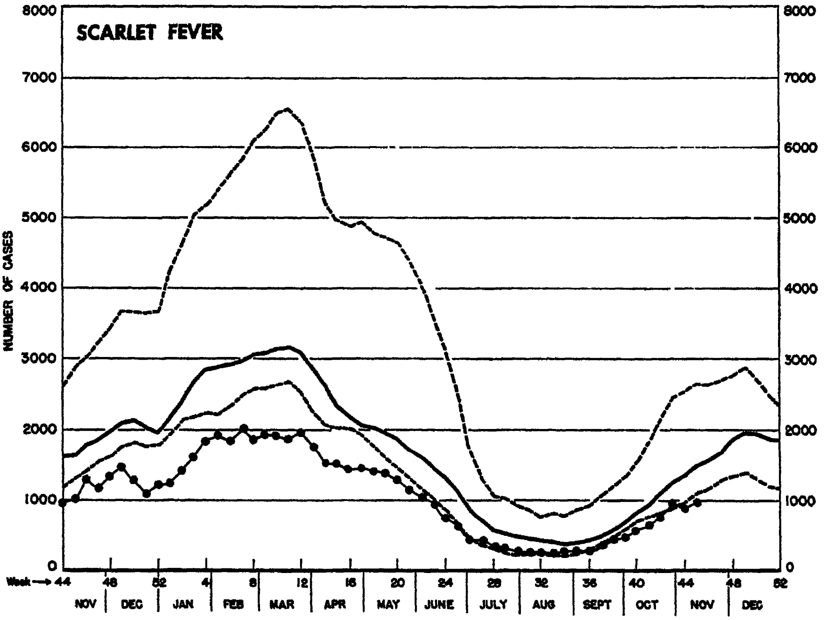
[1] Including cases reported as salmonellosis.
[2] Including cases reported as streptococcal sore throat.

Communicable Disease Charts

All reporting States, November 1949 through Novmber 11, 1950





The upper and lower broken lines represent the highest and lowest figures recorded for the corresponding weeks in the 5 preceding years. The solid line is a median figure for the 5 preceding years. All three lines have been smoothed by a 3-week moving average. The dots represent numbers of cases reported for the weeks of 1950.

FOREIGN REPORTS

CANADA

Reported Cases of Certain Diseases—Week Ended Oct. 28, 1950

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Brucellosis	------	------	------	1	5	2	1	1	------	------	10
Chickenpox	------	------	30	1	110	250	26	90	65	109	681
Diphtheria	------	------	------	------	6	1	------	------	------	------	7
Dysentery, bacillary	------	------	------	------	3	18	4	------	------	------	25
German measles	2	------	------	------	3	59	1	11	12	9	97
Influenza	------	------	35	------	------	------	4	------	------	------	39
Measles	------	------	7	------	139	281	13	15	27	107	589
Meningitis, meningococcal	------	------	------	------	1	4	1	------	------	1	7
Mumps	------	------	7	------	65	219	17	73	96	88	565
Poliomyelitis	------	------	------	------	------	11	3	1	3	1	19
Scarlet fever	1	------	4	1	55	37	29	16	59	54	256
Tuberculosis (all forms)	6	------	8	21	52	32	20	15	------	13	167
Typhoid and paratyphoid fever	------	------	------	------	4	2	------	------	------	4	10
Venereal diseases:											
Gonorrhea	10	------	16	4	71	59	29	18	26	78	311
Syphilis (total)	3	------	13	6	39	19	3	9	4	8	104
Primary	------	------	1	------	2	5	------	2	2	------	12
Secondary	------	------	------	------	2	2	------	1	------	1	6
Other	3	------	12	6	35	12	3	6	2	7	86
Whooping cough	------	------	21	1	61	134	16	6	2	26	267

CUBA

Reported Cases of Certain Diseases—5 Weeks Ended Sept. 30, 1950

Disease	Pinar del Rio	Habana		Matanzas	Santa Clara	Camaguey	Oriente	Total
		Habana City	Total					
Brucellosis	------	------	------	------	------	2	1	3
Cancer	1	------	16	26	27	5	31	106
Chickenpox	------	1	1	------	------	------	2	3
Diphtheria	1	3	7	4	1	------	2	15
Leprosy	------	------	7	------	2	3	------	12
Malaria	------	1	2	------	------	1	7	10
Measles	------	------	1	4	1	------	4	10
Poliomyelitis	1	------	------	------	1	------	------	2
Tuberculosis	------	------	23	21	17	26	24	111
Typhoid fever	2	8	13	9	17	4	24	69
Yaws	------	------	------	------	------	------	3	3

JAMAICA

Reported Cases of Certain Diseases—4 Weeks Ended Oct. 28, 1950

Disease	Kingston	Other localities	Total
Chickenpox	1	8	9
Dysentery	1		1
Leprosy	1	3	4
Poliomyelitis		1	1
Puerperal sepsis		1	1
Scarlet fever	1		1
Tuberculosis, pulmonary	10	20	30
Typhoid fever	11	49	60
Typhus fever (murine)	1		1

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

The following reports include only items of unusual incidence or special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

Cambodia. For the week ended October 28, 1950, four cases (1 death) of cholera were reported in Preyveng Province. This is the first report of cholera in that province. The previous report of cholera in Cambodia was for the week ended March 11, 1950.

Plague

Brazil. Plague was reported in the States of Brazil as follows: Alagoas 5 cases, Paraiba 5 cases (1 death), and Pernambuco 4 cases.

Indonesia. Three cases (2 deaths) of bubonic plague were reported for the week ended September 23, 1950, in the airport of Bandoeng, Java. This is the first report since the middle of June 1950.

Union of South Africa. During the period September 29–October 4, 1950, three cases of bubonic plague were reported in Beaufort District, Cape Province. This is a new focus for the disease.

Smallpox

Kenya. Two cases of smallpox were reported in Nyanza for the week ended August 12, 1950.

India (French). Reported cases of smallpox in Pondicherry were 35 and 34 for the weeks ended October 14 and 21, 1950, respectively.

Indonesia. During the week ended October 7, 1950, 29 cases of smallpox were reported in Bandjermasin. For the week ended September 23, 47 cases were reported. Pontianak reported 7 cases (5 deaths) of smallpox for the week ended September 30 as compared with 30 cases (3 deaths) for the previous week. In Bandoeng, Java, four cases of smallpox were reported for the week ended October 21.

For the past few weeks the number of cases reported each week remained constant.

Typhus Fever

Ceylon. One case of typhus fever was reported for the week ended September 23, 1950, in Western Province.

Guatemala. During August, 7 cases of typhus fever were reported in Guatemala.

India. A case of typhus fever was reported in Nagpur for the week ended October 28, 1950. This is the first case that we have a record of in Nagpur.

Venezuela. During August 1950, 11 cases of typhus fever were reported in Venezuela. This is also the number reported for July.

Yellow Fever

Gold Coast. One suspected case of yellow fever was reported for the period October 16–26 in Bogoso.

Venezuela. The cases of jungle yellow fever in Bolivar State reported in PUBLIC HEALTH REPORTS, Nov. 17, p. 1535, are now known to have occurred as follows: October 6, in Argelia and October 10, in La Parida, near Guasipati.

Plague Infection in Hartley County, Tex.

A report dated November 2, 1950, states that plague infection was proved positive for the following specimens: 147 fleas from prairie dog burrows collected October 19, 1950; 130 fleas from prairie dog burrows collected October 20, 1950; and 24 fleas collected October 20, 1950 from 13 *Onychomys leucogaster*, grasshopper mice. These specimens were taken 5 miles southwest of Dalhart in Hartley County. This is the first time that plague has been reported in that county.

✦ ✦ ✦

The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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2 9 JAN 1951

Public Health Reports

VOLUME 65 DECEMBER 8, 1950 NUMBER 49

IN THIS ISSUE

Public Health: 1950

A topical and selective report of the 78th Annual Meeting of the American Public Health Association and Related Organizations, St. Louis, Missouri, October 30–November 3, 1950

PART ONE

Defense and World Health
Public Health Practice
Environmental Health

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

Linlithgow Library

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
G. St. J. Perrott, Chief of Division

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Public Health Reports

Vol. 65 • DECEMBER 8, 1950 • *No. 49*

Public Health: 1950

ince 1872, members of the several professions making up the public health movement in the United States have assembled annually* to take stock of professional growth and development, to report new facts, and to exchange views and opinions. They have met as members of the American Public Health Association and of a growing group of related organizations. They have come not only from the Western Hemisphere, but, increasingly, from nations across the seas.

This year, almost 4,000 members and friends of the APHA and associated groups met in St. Louis. They heard and, in most cases, participated in presentations by more than 450 of their colleagues. Subjects ranged from aureomycin to yeast, from atomic energy to water resources.

No one person attending the meetings could possibly take part in more than a very few sessions, no matter how far-ranging his interests. Yet, without doubt, those at the conference as well as those who remained at home want to be informed—as promptly as possible—of at least the main trends of discussions, of the important new developments, of the significant contributions in their own fields and in the total field of public health.

With these needs in mind and through the cooperation of Dr. Reginald M. Atwater, Executive Secretary of the Association, the Public Health Service has undertaken to provide a reporting service on the entire meeting. The result of our efforts appears in this and the next issue of PUBLIC HEALTH REPORTS.

This account does not present either abstracts or summaries of the papers presented, or a chronological accounting or editorial evaluation of the meeting. It is news-type reporting of the highlights of many of the sessions . . . a panorama of "Public Health: 1950."

We have dealt only with the scientific sessions of the meetings. Association business has not been reported, this being a function of the official Journal. And no full papers, of course, are published. Complete texts of the leading papers have already begun to appear in the American Journal of Public Health, and others will appear in appropriate specialty journals.

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*Except for 1945.

Our primary sources have been the advance abstracts, press releases, and texts available through the press-room facilities of the Association in St. Louis. This accounts for much of the selective character of the report. Material which was not available in some script form obviously could not be included.

It should be reemphasized that this is basically a "news" approach aiming at highlights and items of broad interest. We have attempted to give the essence of the presentations reported upon, but by no means the complete story in each case. We have endeavored to reflect accurately the intent of each speaker, although we have had to take somewhat extensive editorial liberties in the interest of brevity. The source of each report is stated and it must be clear that the author—not the Public Health Service—is the authority in each instance.

Because of the large number of presentations involved, two full issues of PUBLIC HEALTH REPORTS are being devoted to this reporting service. Material has been organized topically. In the present issue, the topics covered are: defense and world health, public health practice, and environmental health. In the next issue we will report on epidemiology, chronic disease, child health, and medical care.

The material is put forth on a more or less experimental basis both as to content and presentation. We hope our readers will give us the benefit of their comments and suggestions.

This report was prepared under the direction of Howard Ennes, M.P.H , Office of the Surgeon General, Public Health Service. Appreciation is expressed to the more than 20 members of the Public Health Service staff who aided in the collection and summarization of the material, and to the editorial staff of PUBLIC HEALTH REPORTS who participated in the summarizations in addition to editing the material for publication.

Defense and World Health

INTERNATIONAL HEALTH

Major Factor in Foreign Policy

World-wide health improvement—a major factor in economic and social progress, and thus in the preservation of peace—has become a major concern of American foreign policy, Willard L. Thorp, Assistant Secretary of State for Economic Affairs told the APHA.

Our stake in the well-being of other peoples is based on a deep conviction that the very survival of our democratic society depends upon the creation of a free, peaceful, orderly, and prosperous world society, he said.

Mr. Thorp pointed out that our concern for the health and well-being of other peoples did not arise out of the current conflict although "that struggle has helped to focus public attention on unsatisfactory living conditions on which communism feeds."

Public health improvement in underdeveloped countries constitutes an excellent investment not only for the country concerned but also for others, he stated. A malaria expert has stated that imports into the United States from malaria-ridden countries carry a hidden malaria tax of about 5 percent due to increased cost of production under such conditions. This would mean that in 1938 malaria in foreign countries cost the United States $175,000,000. Today it is probably more. That is a huge sum in comparison with what we are now spending on health improvement outside our own country.

Integration Necessary

Terming health, food production, and education the foundation stones of decent living conditions, Mr. Thorp stressed their interdependence.

"People who are sickly and weak cannot produce effectively and have little interest in learning. People who are poorly fed are more susceptible to disease and indifferent to education. People who are ignorant will not readily understand the reasons for sanitation and better farming practices," he said.

World Health Organization teams are already doing valuable work in many parts of the world. There are malaria, tuberculosis, and VD teams in India. There are yaws eradication teams in Indonesia. WHO sanitary engineers are working among the Arab refugees from

Palestine. Expert advisers are stationed in many countries. An important fellowship program is slowly building a pool of trained people who are destined to staff national health administrations.

Although the World Health Organization today stands ready to promote a large-scale campaign for health improvements in those parts of the world which need it most, Mr Thorp pointed out that the success of the health program will depend in part on how closely and how well it can be integrated with the United Nations program of technical aid to underdeveloped areas.

The UN program was conceived last June at the first Technical Assistance Conference of the United Nations. Fifty nations have contributed more than 20 million dollars for the first year's budget. In the meantime Congress has launched the American Point IV program with a 34½ million dollar appropriation.

Calls for Volunteers

Mr. Thorp appealed for volunteers in the work of building a healthier world. The greatest need, he said, will be for people who are not only good technicians but good teachers; people who are not only good Americans, but good internationalists. The Public Health Service will backstop these programs as far as it can, but it has not enough personnel to do it alone.

Today over 150 American health technicians of all kinds are out in the field on technical assistance projects under the United States Government auspices. By next June, we hope to have an additional 300 new people. Mr. Thorp expects the number to be proportionately larger the following year.

Cooperation will also be needed in providing hospitality, orientation, and training to the many visitors, trainees, and graduate students who come here to observe and study American techniques and health organization, he pointed out. In the past 4 months alone more than 500 such people have come to the United States, and many more are expected.

WORLD SANITATION

Clean Environment Key to Health

The sanitary engineers of America—in almost unique fashion—hold the key to the problem of the rapid and effective development of world health, Henry van Zile Hyde, M.D., told public health engineers and the Conference of State Sanitary Engineers at the APHA meeting.

Dr. Hyde, who represents the United States on the executive board of the World Health Organization and is also Director of Health and

Sanitation for the Institute of Inter-American Affairs, said the problem is in "the first instance one of sanitation."

Except in the Americas, he said, the basic position of the sanitary engineer is not fully recognized with the result that the importance of sanitation, though recognized at an intellectual level, lacks the driving force sanitary engineers put behind it here. Accordingly, sanitation in many parts of the world is miserably inadequate while health sciences academically may be highly developed.

The major world health problem today, he maintained, is not death but the chronic infection and infestation which converts man from a productive unit to a liability to society. Most of this is due to the fact that 1½ billion persons are living in conditions of primitive sanitation, where health officers drink wine for their own safety rather than the water they are responsible for.

The multilateral (such as WHO) and bilateral (such as the IIAA) types of international health activity were explained and contrasted. The speaker urged strengthening and expanding the bilateral type until true multilateral internationalism can attack the world's health problems.

United States Takes Lead

"The United States alone cannot, of course, remedy the existing situation," he said. "The peoples themselves must eventually clean their own environment, and keep it clean." But the United States can take and is taking the leadership in moving the world toward this necessary goal by—

> Continual insistence, in the health councils of the world, on the fundamental importance of a sanitary environment;
>
> Insistence, in economic and political councils, upon the basic importance of man's productive capacity as an element in economic progress;
>
> Demonstration abroad through cooperative programs of the techniques that improve public health, and
>
> Education of leaders in these techniques in our schools or through loans of our teachers.

"But the United States will not be satisfied with a program of WHO until that program shows full evidence of vigor in attacking the problems of basic sanitation and until it recognizes that the engineer trained specifically for this is the person most competent to do it," Dr. Hyde emphasized.

Water Supply Selling Point

Visitors to the underdeveloped countries are impressed, he noted, with the great interest being shown toward better public health by the governments and their people. The current demand for health action can be attributed to the training given thousands of technicians during the past few years and to the many demonstrations of public health techniques. "Indeed," he stated, "we would be poor salesmen if we failed to develop broad markets for our particular product now that we have some resources to use in advertising it."

Dr. Hyde showed how the installation of a water supply system in many backward areas stimulates increasing and continuing interest in public health and related how, on IIAA projects, the contribution made by many communities was not and could not be in cash but was made, nevertheless, in terms of back-breaking labor by the people who eventually benefited from the work.

ENVIRONMENTAL CONTROL

Water Supplies Demand Priority

In a war situation, public water supplies and related sanitary engineering services will again demand top priority consideration of our public health services, according to Mark D. Hollis, C.E., PHS Assistant Surgeon General and Chief Sanitary Engineer.

Surreptitious efforts to spread poisons or infections is a possibility we must prepare for, he stated. One practical step is extension of coordinated research into detection of noxious matters and protection against them. The PHS Communicable Disease Center is moving into the field of airborne pathogens and epidemic intelligence, and the Service's Environmental Health Center is working on techniques for using the new microscopic filter as a laboratory tool for application in sanitary bacteriology. With some modifications, the filter may prove valuable in purifying small quantities of drinking water. It promises to be a quick and economical method for general bacteriological examination. It can be produced inexpensively, and it is easy to use.

A new sterilizing agent containing a silver compound may prove to be another defense against bacteria in water. Preliminary reports indicate that this material, under specified conditions, is not only an effective bactericide but also appears to have unusual residual qualities, Mr. Hollis observed.

Public water supplies may be designed for greater protection. A system of dual clear wells with sufficient capacity can be alternated in use to gain the advantages of long retention in each. Animal testing combined with this system will further safeguard against poisons in the water supply. Another advantage may be gained from use of valves designed on the differential pressure principle for preventing backflow. The valves are now on the commercial market and are proving highly satisfactory, Mr. Hollis reported.

WARTIME DISEASE CONTROL

Must Streamline Present Operations

Where does peacetime disease control leave off and wartime disease control begin?

In a report to a special APHA session, W. Palmer Dearing, M.D., Public Health Service Deputy Surgeon General, and J. O. Dean, M.D., Assistant Surgeon General, pointed out that the solution of wartime disease control problems demands not a revolution but a strengthening and streamlining of operations.

The familiar tools of reporting, identification, and control are at hand to deal with communicable disease from whatever source, the conference was reminded. A period of mobilization or a war emergency simply requires that these tools be in good repair, that they be available, and that they be used effectively, the doctors said.

Revised Reporting Planned

The Public Health Service has prepared a tentative plan for improving the present system of communicable disease reporting. Preliminary trial of the plan will begin January 1, 1951. It will provide for (1) a new minimum list of diseases for reporting by local health officials to the State and, in turn, to the Public Health Service, some by telegram, the others by mail; (2) periodic statistical reports which will furnish the base line of expected cases; (3) minimum content of a general morbidity case report form. In addition, the plan will foster telephoned reports of unusual diseases occurring in the community or of unusual outbreaks of usual diseases, the PHS officials added.

As a part of epidemic intelligence, local health officials were advised to consider, at least on a sampling basis, records of absenteeism in selected industrial or educational establishments. Significant illness would show up first in absence from work. Hospital reports on bed occupancy probably would also serve as a valuable index to a sudden increase in disease.

To make the best use of the information reported, epidemiological teams, backed by competent laboratory services, must be set up, they stated. For services not available locally, health departments may want to turn to universities, research centers, or other areas of special competence, such as the cooperative influenza listening post of the National Institutes of Health. The Communicable Disease Center of the Public Health Service is prepared to assist States in both reference laboratory service and in epidemiologic field investigation.

Day-to-day sanitary practices will be the principal bulwark against induced disease, they advised. Normal controls for safeguarding public water supplies and for preventing the entry of unauthorized persons to treatment plant premises, the supervision of milk plants and dairy farms, the exercise of controls over food processing establishments, drugs and biological products, and many other forms of surveillance take on added significance in the present situation.

Fortunately, the development of simpler and more effective environmental safeguards has been going forward in recent years, they reported. And efforts are being redoubled to develop known sanitizing agents and detecting devices and to create new ones that can be generally applied with safety and effectiveness in water, food, or atmospheric bacteriology.

The overriding problem in planning for wartime disease control, the PHS officials stated, will be in maintaining a state of readiness over a long period of time for an eventuality that may never occur.

"Like many other nations, we will have to strike a pace of preparedness that will provide us with at least optimum safeguards and, at the same time, one we can sustain. Failure in attaining a balance between these two extremes is to court disaster, from without on the one hand, from within on the other. To attain such a balance is the prime challenge of the times," Drs. Dearing and Dean said.

Also at this special session Norvin C. Kiefer, M.D., Director of the Health Resources Office, National Security Resources Board, spoke of the role of health services in civil defense, and Howard A. Rusk, M.D., Chairman of the Health Resources Advisory Committee, NSRB, discussed health resources and services in a national emergency. Herman E. Hilleboe, M.D., New York State Commissioner of Health, described the health officer's responsibility in civil defense as illuminated by British experience and as now being carried out in New York State.*

BIOLOGICAL WARFARE

Preventive Medicine in Reverse

Many exaggerated and sensational statements have appeared as to the deadliness of biological warfare (BW), while the fact is that an enemy could not spread thinly or widely enough any BW agent to produce illness or death over great parts of the country, Frank R. Philbrook, M.D., Deputy Director of the Preventive Medicine Division, Bureau of Medicine and Surgery, Navy Department, told the Laboratory Section.

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* The essential content of these three papers was included in the remarks of these officials as reported in PUBLIC HEALTH REPORTS, Nov. 17, 1950, pp. 1497–1499, 1508.

Three key questions concerning BW were defined as: What are the agents likely to be used? Where and how they will be used? What constitutes our defense? It is impossible to state which of the one or two dozen possible agents would be used, Commander Philbrook said, noting that bacteria, viruses, rickettsia, and certain fungi are likely candidates.

Targets for BW are large civilian or military population areas. Air attack could be used with explosives. The biological agents would be neither effective nor detectable until incubated. A second method of dissemination is sabotage. Sabotage of water would have to take place at a point where chlorine residuals are low, not at reservoirs where water purification starts. Food sabotage would be directed at foods eaten uncooked, he said.

Since biological warfare is essentially public health and preventive medicine in reverse, it follows that we must strengthen our efforts in these fields, Commander Philbrook said. Some principles of defense against biological warfare he listed as:

Coordination of BW defense with other warfare defense; preparation of professional and technical personnel for variations of the usual disease characteristics due to unusually high dosage, unusual portal of entry, or simultaneous occurrence of two or more diseases; early institution of epidemic control measures to minimize the effects of BW agents, with the possibility of specialized reporting, such as daily reporting of industrial and school absenteeism; rapid diagnosis and rapid therapy of communicable diseases; immediate availability of chemotherapeutic and antibiotic substances; intensified research in immunization to develop more vaccines; possible distribution of gas masks to the civilian as well as to the military population; sterilization of drinking water immediately upon suspicion of contamination; use of educational means and radio and press for allaying fear and avoiding panic; preparation of nontarget communities for provision of help in case of BW attack.

LOCAL RESPONSIBILITY

World Statistics Group Sets Pattern

National committees, patterned after or analogous to the national committees set up to serve as links with the Expert Committee on Health Statistics of the World Health Organization, are one effective way of developing needed local responsibility for world health, Lowell J. Reed, Ph.D., Vice President of Johns Hopkins University and President of the APHA, said in a general session.

Pointing out that establishment of a fine, democratically operated headquarters at Geneva was not enough, Dr. Reed stated, "a democracy is successful only if there is an intense and active interest in it on the part of a wide variety of people at the local level."

Dr. Reed stated that the decennial revisions of the International List of Causes of Death is one of the best examples of international cooperation stimulated from a national level. In fact, the formation of the WHO Expert Committee on Health Statistics resulted from recommendation of the Paris Congress on the revision of the list.

The speaker noted various projects undertaken by the Expert Committee which had been reassigned to the national committees "deliberately to encourage decentralized work with widespread participation." The national committees remain national and formally are not part of the international structure, but they undertake to see that all interested agencies in the country have the chance to aid in developing any aspect of medical statistics. They do this in the ways suitable to their own governments and social structures.

Dr. Reed suggested that WHO avoid the dangers of bureaucracy by developing broadening instead of in-growing programs. He suggested, as an example, that the WHO public health school at Geneva undertake a leadership role in the development of methods of education in the field of public health that would be suitable to various parts of the world and all stages of the educational process—rather than just another school like those at London, Calcutta, Boston, or one to train persons for WHO or for careers in their own country.

ATOMIC ENERGY

Gap in Radiation Protection Administration

By most criteria hitherto used in the public health field, atomic energy appears a matter of great importance to public health practitioners, Abel Wolman, D.Eng., Professor of Sanitary Engineering at Johns Hopkins University, told the special APHA session on civil defense.

As obvious as this fact is, he remarked, few if any of the official agencies have developed the necessary staff or administrative procedures. "That such a major gap in health department responsibility should be permitted to continue is one of the mysteries of the last decade," he said, and "for the welfare and health of the Nation the gap should be closed."

Skilled Professionals Needed

Dr. Wolman felt that a minimum requirement for State and local activity in this field was development of at least a few key professionals in each department who are familiar with and skilled in the atomic energy field. He noted that the United States Atomic Energy Commission points out in its report for the first 6 months of 1950 that "in such large concentrations of material, either naturally radioactive or made so in various operations of the program, these same types of radiation create potential hazards. Workers must be protected against them when they are generated in manufacturing processes. The public must be protected by safe handling of the unique industrial wastes. Special safeguards must be set up and maintained in research that involves radioactive material or release of radiation."

Whether for reasons of the mystery of the industry and its products, or of the secrecy which has surrounded many of its operations, or whether because the measurement of its effects is still complex, it is difficult to say, but most of the official agencies have decided consciously or subconsciously to ignore the existence of the trade, its products, and its wastes, Dr. Wolman pointed out.

Public Will Demand Local Control

Some have said that the problems are so complex that a Federal health agency should look after them and let both information and control filter downward rather than upward from the local areas. This is "a departure from principles hitherto controlling in this country," he noted, that also "will prove untenable, for as the uses expand and the difficulties increase, the public will require more rather than less local supervision and control."

Relatively few health agencies are trying to "live with radiation administratively," and this is a strange situation, Dr. Wolman observed. Certainly during the last half century no health department has decided to ignore the hazardous trades either because of their mystery or because of their complexity.

State and local programs should be developed, and staff trained, that will assure the evolution of both peacetime and wartime rules of action which would gradually encompass responsibility for the control of the hazards potentially inherent in nuclear fission operations and in the use of their products. The public health profession and the atomic energy industry, Dr. Wolman felt, jointly have a grave responsibility as well as a great opportunity to serve the public.

Public Health Practice

PREVENTIVE MEDICINE

Metamorphosis Seen in Teaching

The role of preventive medicine in the future development of medicine and education for medicine within medical schools will be shaped by the merger of scientific medicine, public health, and psychiatry, Lester J. Evans, M.D., Executive Associate of the Commonwealth Fund, told the Conference of Professors of Preventive Medicine.

In our modern educational system, Dr. Evans said, the university hospital has become the symbol of scientific medicine. It is there that the findings of the basic science laboratory are translated into study of human physiology and pathology.

The principal original contribution from public health to scientific procedures has been the brilliant application of the quantitative method of the study of community and other mass phenomena. It is thus that medicine has had opened up to it the opportunity to study man in relation to the events taking place in his natural environment.

The "Life Situation"

Modern psychiatry has helped us to understand that man really functions as an integrated whole, he said. The evidence comes strikingly from the joint efforts of psychiatry and scientific medicine in the study of the relationship of such phenomena as hypertension, asthma, gastric ulcer, and headache to the life situation of patients.

"The expression 'life situation' immediately calls for a conception, in terms of movement through time and in relation to the total environment, of the human as well as the infectious, physical, or nutritious elements. Thus, the dynamic nature of life processes is further emphasized and the human element of environment stands out in bold relief," he continued.

Dr. Evans discussed how preventive medicine could make contributions through research, teaching, patient care, and departmental organization. Environmental components, longitudinal studies in community settings through quantitative methods, social science in medicine, preventive medicine at the "living level" involving normal psychology and physiology, and the family, individual, and community needs for medical care were pointed to as areas of fruitful research.

The Patient as a Person

Teaching tasks in preventive medicine include techniques of prevention of communicable disease, understanding of epidemiology and quantitative methods, sensitization to opportunities for arresting the development of noncommunicable disease. The medical student should be made aware of the patient as a person and should be shown how medicine can help to maintain or increase productive energy in both normal and handicapped individuals, Dr. Evans said.

If preventive medicine is to survive, it must play some role in patient care such as emphasizing continuity and integration. The patient as seen in the outpatient department, at home, and through the work of the general physician offers this opportunity.

Teachers of preventive medicine, Dr. Evans felt, must give increased attention to problems of departmental organization and staff. Should it be a medical school department in the ordinary sense, or an administrative function? Should new money be found for financing, or old money moved to new uses? Basically, the total staff must be equipped to look at the patient in his social and environmental setting.

The nature of this "metamorphosis" will depend on the philosophy in each school, Dr. Evans felt. The current survey of medical education can be very significant if it thaws the present structure of medical education and medical school organization and philosophy. Any basic contribution which preventive medicine may make in the future is most likely to happen in an educational institution where there is fluidity and flexibility in action as well as thinking.

PUBLIC HEALTH ADMINISTRATION

Services Dispersed, Authority Divided

In the past 10 years State health services have grown greatly in extent and variety . . . and the division of authority is more pronounced, health officers at the APHA were told by Joseph W. Mountin, M.D., Assistant Surgeon General and Associate Chief of the Bureau of State Services, PHS.

The decennial survey of State health activities and administration being conducted by the PHS reveals that many new activities have been added and programs already in operation have been expanded. There is, however, wide dispersion in the assignment of health activities among the various agencies of State government. This complexity of organization has particular significance at this time, Dr. Mountin felt, when State health agencies may be called upon to undertake new and unusual tasks in connection with the developing national emergency.

Not only are numerous agencies engaged in most health activities but also the combinations of agencies involved differ greatly from State to State. In fact, no pattern or common set of principles seems to exist either in division of responsibilities or in assignment of functions. Greater effort is being made, however, to form a coherent program out of the independent health activities of numerous agencies.

The extreme dispersion of responsibility among a multiplicity of agencies complicates Federal, State, and local relationships for both routine and special demands. If the existing structure of State government is to be used effectively across the Nation to meet emergency requirements, it is important that some degree of similarity should prevail for handling comparable problems. Dr. Mountin emphasized that complete and permanent changes cannot be made overnight. But he pointed out that if State health agencies are to maintain and strengthen their position of leadership in all matters pertaining to health—particularly in the critical days immediately ahead—they must endeavor to effect working arrangements for drawing together common health functions.

MEDICAL JUDGMENT

How Much Medical Administration Is Nonmedical?

One of the acute problems in the Nation's public health manpower shortage is that of meeting the increasing demands for public health trained medical personnel to fill administrative positions. If physicians could be relieved of the administrative details which do not involve medical judgment, it would serve to stretch available medical manpower and would make public health careers more attractive.

But just what do medical administrators do—and how much of their job requires medical judgment and how much could be done by other administrative personnel? Health officers at APHA heard some answers developed from a PHS staff study and reported by Harald M. Graning, M.D., M.P.H., Chief of the State and Local Health Services Branch, Division of State Grants, PHS. Detailed 1-week work reports were provided by 173 physicians in administrative positions in 34 States. Almost 11,000 "individual occurrences of activity" were analyzed in terms of time and type.

Somewhat less than three-fourths of all activities and time involved medical judgment, it was reported. There were no activities for which all time was reported as not involving medical judgment. The highest percentage of time for a single activity in which medical judgment was not involved was housing with 74. Travel time was 69 percent nonmedical, purchasing and equipment supervision, 56 percent each.

Medical administrative personnel spend around 60 percent of their time in programs other than their own, suggesting that the traditional concept that categorical program division directors get experience in but one field needs revision, Dr. Graning observed.

Although the results of the study do not point to any single activity or group of activities which can be definitely marked as suitable under all circumstances for delegation to nonmedical administrative assistants, it is evident that there are certain types of activities which were frequently considered as not involving medical judgment. Delegations to competent nonmedical administrative personnel would sometimes involve new positions. On the other hand, Dr. Graning suggested, examination of the resources of a department might disclose that these duties could be assigned to persons already employed. It might also be found that by pooling certain activities in which medical judgment is not involved and are now carried on by several medical administrators, there would be a full-time position which would warrant the addition of a well-trained nonmedical administrative assistant.

The maximum utilization of nonmedical administrative assistant personnel is necessarily dependent upon their availability and competence. The activities reported as not involving medical judgment should serve as guides in planning the recruitment and training of nonmedical administrative assistant personnel. Postgraduate schools might well consider the potential market for trained administrative assistant personnel, for State health departments are but one of the groups that might profitably employ them, Dr. Graning felt.

PERSONNEL SELECTION

Choosing Health Administrators

"Is there a science of personnel selection?" was one of the problems grappled with by APHA members interested in merit system service. Three men of experience attempted an evaluation.

Milton M. Mandell, Chief of Administrative Management and Testing of the United States Civil Service Commission, reported that current research indicates that a person who is basically a technician in his interests is not generally a good administrator, and that interest in theoretical matters is related to administrative success. There seems to be a negative relationship between desire for monetary reward and success as a public administrator. Knowledge of administrative structure and policies of the place of employment seem to bear a relationship to administrative success.

In the measurement of personal characteristics, emotional stability and buoyancy should be looked for, Mr. Mandell noted. Currently, the most satisfactory method of measuring these is by a thorough investigation of the individual through personal discussions with people competent to judge. Proper questions must be asked, the right people must be sought for their opinions and observations, and great skill should be used in evaluating the information collected.

Philip Hunter DuBois, Ph.D., Professor of Psychology at Washington University, St. Louis, underscored the importance of the interviewer knowing a great deal about the job to be filled as well as being expert at interviewing techniques.

John M. Stalnaker, Director of the Division of Student Personnel Studies of the Association of American Medical Colleges, reviewed recent developments in aptitude testing. He noted that each of the 79 medical schools has developed its own system of screening and evaluating applicants and students.

BUSINESS MANAGEMENT

Role of Nonmedical Administrators

With shortages of skilled medical and other technical public health personnel, it has become increasingly important to provide for the most effective utilization of scarce skills and to guard against their dispersal in tasks where they are not essential prerequisites for effective performance, Murray R. Nathan, Director of the Office of Planning for the New York State Department of Health, said in moderating a panel discussion on the use of nonmedical administrators in public health. This was one of two key topics—the other had to do with patterns of State-local fiscal relations—at the American Public Health Association meetings of the Association of Business Management in Public Health.

Mr. Nathan pointed out that there is a growing realization that personnel engaged in public health work can no longer be neatly divided into "medical, nursing, and engineering personnel" and "clerks, typists, and stenographers." Between these two fields there have always been the responsibilities for such administrative practices as personnel administration, fiscal management, administrative planning and analysis. Proper discharge of these responsibilities requires special training and skills not as a rule found in public health professionals.

Paced by a panel consisting of Russell O. Saxvik, M.D., North Dakota State Health Officer; Cecil G. Sheps, M.D., Associate Professor of Public Health Administration at the University of North

Carolina; and Charles B. Frasher, Field Consultant for the American Public Health Association Merit System Service, discussion developed the point that in the broad field of public health there is a job of management—of people, finances, facilities, equipment, supplies—which although closely related to the technical practice of public health is in itself a special task requiring preparation and skill.

There is need for persons skilled in general administration to relieve the already overburdened medical, nursing, and sanitation personnel. But it was also strongly pointed out that the medical health officer with his special knowledge and skills in public health could never be supplanted by nonmedically trained personnel. It was felt that tasks beyond already established ones of personnel and fiscal management should be defined. The question of whether administrative training should precede or follow orientation in public health was left up in the air, but it was agreed that schools of public health should include, as part of their curriculum, some training in specific tasks of management.

State-Local Fiscal Relationships

An objective formula basis for local grants-in-aid is in effect in only a third of the States, and many of the plans do not contain the elements of an effective joint financial assistance plan, Clifford H. Greve, Chief of the Analysis and Reports Branch of the Public Health Service Division of State Grants, reported. He was moderator of a panel including Stephen C. Newitt, Director of the Division of Administrative Services, Louisiana State Department of Health; Paul B. Shanks, Administrative Assistant, West Virginia Department of Health; George A. Dame, M.D., Director of the Bureau of Local Health Service, Florida State Board of Health; and Clifford C. Shoro, Director of the Office of Business Administration, New York State Department of Health.

Discussion indicated that while most States pay grant funds on some type of reimbursement basis, there is little uniformity in other phases. It was emphasized that no one plan can be applicable to all States, but that there are basic concepts which can be utilized effectively.

CURRENT STATISTICAL PROBLEMS

Comparability of Entries in International Lists

The APHA Statistics Section and the American Association of Registration Executives heard discussions of three important current problems. One was the effect of single versus multiple causes of death under the 5th and 6th International Lists. This was reviewed by O. K. Sagen, Ph.D., Chief of the Division of Vital Statistics and Records of the Illinois State Department of Health. The basis for his paper was a cross-tabulation of cause of death data (Illinois death certificates) coded by the 5th and 6th revisions. A "comparability factor" was applied, using as one of the elements the number of causes coded in the same entity under the two classification systems. When a single cause of death was given on the death certificate, the comparability factor was closer to 1 than when multiple causes appeared.

Iwao M. Moriyama, Ph.D., of the PHS National Office of Vital Statistics, pointed out (in comments read by Dr. Halbert A. Dunn) that it is important to know the frequency distributions for the other rubrics in the cross-tabulations. It was suggested that a "comparability ratio" be used, with the important fact being whether or not this ratio is sufficiently close to 1.0 so as to make the correction for the transition in classification change unnecessary. Since ratios are being used to smooth out time trends, it is not necessary to compute them separately for single and multiple cause reporting. Other discussions indicated interest in multiple cause tabulations on a repetitive basis and crossed by such characteristics as age, race, and sex. Question was raised concerning the detail of such tabulations, and the problem of interpreting a large mass of data was mentioned.

Occupational Mortality Analysis

Relating reports of occupation and industry on death certificates to a census enumeration population and interpretation of these data are important considerations in the making of occupational and industrial mortality studies, according to W. Thurber Fales, Sc.D., Director of the Statistical Section, Baltimore City Department of Health.

Difficulties have been overemphasized, Dr. Fales felt. Occupation and industry are sufficiently stable in the older ages, and these reports are derived fundamentally from the same kind of statistics which are used in other types of mortality analysis. Also, a continuous campaign to improve the statements of occupation and industry on death certificates has produced marked advances in the quality of entries. Such analyses should not be expected to provide measurement of the precise risk of the various occupations. Rather, computations by occupation and industry will furnish valuable leads for further study of both morbidity and mortality.

Robert C. Strauss, Biostatistician with the NOVS, found that occupation was generally well reported on death certificates for the Nation (95 percent of the entries were classifiable). The reporting of industry was not as complete (88 percent were classifiable). He also noted that while population data on occupation and industry from the 1950 census enumeration will cover only the labor force, satisfactory data will be available to compute occupational and industrial mortality rates for males 20 to 64 years of age.

Robert J. Vane of the Metropolitan Life Insurance Co., and Chairman of the Committee on Occupational and Industrial Mortality Statistics of the Statistics Section of the APHA, reviewed the efforts of this committee to encourage and coordinate statistics in this field. NOVS and 10 States are conducting occupational mortality studies.

An index number designed to overcome difficulties inherent in the age-adjusted death rate was presented by Jacob Yerushalmy, Ph.D., Professor of Biostatistics at the University of California School of Public Health. Essentially, the index summarizes proportionate changes in age-specific death rates, giving equal weights to the age-specific rates regardless of their magnitude.

Robert D. Grove, Ph.D., of NOVS, felt that the method should be subjected to an analysis of the results obtained in comparisons between areas and in descriptions of mortality trends. One factor is, he said, that the index ignores several elements such as the number of persons affected by differences in rates. Mortimer Spiegelman, Assistant Statistician of the Metropolitan Life Insurance Co., and Miss Margaret Shackelford, Director of the Division of Statistics, Oklahoma State Department of Health, mentioned that it was important to develop a summary measure which could be computed readily by State offices of vital statistics and interpreted by them for general consumption.

Statistical Sampling

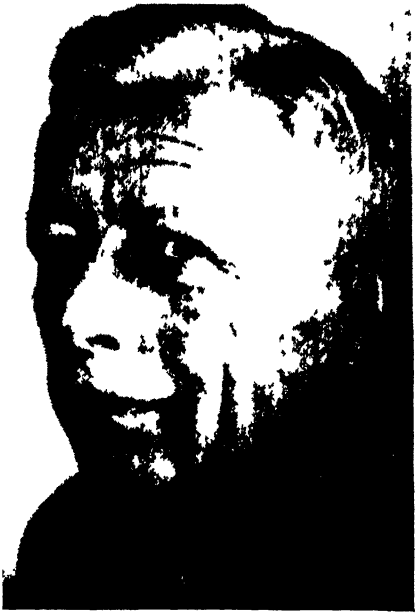
Public health statisticians at APHA heard three experts on problems of design of population samples point out some of the pitfalls and techniques in the use of samples in public health surveys. Although sampling theory is well established, it is not well known and applied, they felt. Recent developments also make possible greater accuracy for money spent. Speakers were: William G. Cochran, Professor of Biostatistics at the Johns Hopkins School of Hygiene and Public Health; Morris H. Hansen, Assistant Director of Statistical Standards, Bureau of the Census; and Jerome Cornfield of the Office of Biometrics, National Institutes of Health.

NURSING RESEARCH

More Planned Studies Needed

The nursing profession is beginning to assume responsibility for doing its own research at a level to stand the test of the scientific

R. E. Dyer Awarded 1950 Sedgwick Medal



Dr. Rolla E. Dyer

Rolla E. Dyer, M.D., recently the Director of the National Institutes of Health, Public Health Service, and now Director of Research at Emory University, Atlanta, has been awarded the Sedgwick Memorial Medal presented by the APHA "for distinguished service in public health."

A Public Health Service officer for 34 years, Dr. Dyer was Director of NIH from 1942 to 1950.

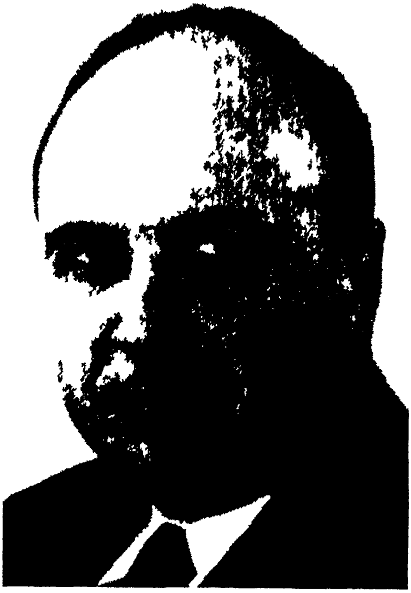
Dr. Dyer's reputation for outstanding research on Rocky Mountain spotted fever, typhus, and Q fever are well known, and he has received many honors, including the Lasker Award from APHA, the Carlos J. Finlay Medal of Cuba, the U. S. A. Typhus Commission Medal, and the War Department Certificate of Merit. On November 9 of this year he was again honored by the American Society of Tropical Medicine in Savannah, Ga., where he received the Walter Reed Medal. He has been among the more fortunate of the research scientists who have survived laboratory infections—in Dr. Dyer's case, both typhus fever and Q fever.

Upon retirement from the Service, friends and colleagues of Dr. Dyer's at the National Institutes of Health and elsewhere presented him with a scroll announcing the establishment of the R. E. Dyer Lectureship at the Institutes.

method, Marion Ferguson, Ph.D., of the Public Health Nursing Division, PHS, said as moderator of a panel on research before the Public Health Nursing Section. Reports of methods and techniques in four current studies were reported.

Factors involving nurses when making their choices of first level public health positions, particularly in official agencies outside the large cities, are under study in Kansas, said Therese Jenniges of the State Health Department. From the Indiana State Health Department, Lucille Wall reported a study of methods to stimulate interest on the part of public health nurses in chronic disease and gerontology. Cost analysis procedures, extent of use, and next steps were discussed by Ruth Fisher, Associate Director of the National Organization of Public Health Nursing. Dorothy Carroll of the Communicable Disease Center, PHS, reported on the bacteriological procedures being applied in a study of thermometer techniques.

Discussion indicated the desirability of inclusion in basic and



Dr. William H. Sebrell, Jr.

W. H. Sebrell Named New Director of NIH

William H. Sebrell, Jr., M.D., became the new director of the National Institutes of Health on October 1, succeeding Dr. Rolla E. Dyer upon his retirement from the Public Health Service.

Dr. Sebrell was formerly director of the Experimental Biology and Medicine Institute of the National Institutes of Health. He began his research career under Dr. Joseph Goldberger, the world famous Public Health Service scientist who discovered that pellagra is a dietary deficiency disease. Besides his own work on pellagra, Dr. Sebrell covered much of the field of vitamin B complex research and has made important contributions to our knowledge of dietary needs and deficiencies.

Dr. Sebrell was instrumental in drawing up the first international standards of nutrition for the League of Nations. He is also credited with having pioneered in gaining acceptance of scientific nutrition as a regular function of modern States and local health departments.

In recognition of his research achievements, Dr. Sebrell has received the Mead Johnson Award of the American Institute of Nutrition, the Research Medal of the Southern Medical Association, and the Army Legion of Merit.

advanced curricula for nurses at least stimulation of positive attitudes toward research, and emphasized the need for training nurses in research methods. Advisability of a master plan for research in nursing was suggested and the current status of the recently established Clearing House on Studies in Nursing was described.

SOCIAL SCIENCE

Must Understand Community Trends

Any unit of public health activity which disregards the increasing democratization of American life and goes on its way "doing something for" its constituents is moving counter to recognized trends in community life, said Earl Lomon Koos, Ph.D., Professor and Chairman of the Department of Sociology at the University of Rochester.

He spoke in a discussion of economics, psychology, and sociology in public health before the Health Officers, Public Health Education, Public Health Nursing, and School Health Sections.

If public health administration is to be effective, Dr. Koos said, and if it is to maintain itself on a level with other activities in the community, it must think in terms of the functioning groups in the community, of the effective leadership in these groups, and must work with that leadership in gaining acceptance of health goals and in developing health practices. Sociology and anthropology can make real contributions to public health by aiding in the identification of the "natural communities" which are the effective groups for action, and in describing and understanding the cultural and other social patterns which delimit individual and community action.

Contributions of economics to public health, and their close relationships, were analyzed by Dwayne Orton, Director of Education for International Business Machines Corporation. Psychology in public health was reviewed by O. H. Mowrer, Ph.D., Research Professor of Psychology at the University of Illinois. He felt that perhaps the greatest single obstacle to advances in mental health is the belief, widely shared in professional circles and in the population at large, that mental disorder arises because of biological frustration.

HEALTH EDUCATION

Building Health Practices a Team Job

Since the term "health education" was created in 1918, tremendous strides have been made in health promotion. But the dream of its originators—a world of healthy people—has not yet come true even though better health is within the grasp of every American, Sally Lucas Jean, R.N., Consultant in Health Education to the National Foundation for Infantile Paralysis, reminded the Health Education Section.

To get the public to translate health knowledge into health practices is not easy, declared Miss Jean. It is a job not only for the professional health educators but also for teachers, nurses, physicians, and all others concerned in better health practices. The advances already made in improved health of the American people, such as sturdier and more robust school children, are gratifying, but health educators cannot take sole credit for achieving these gains. Other factors which have made these gains possible have been better care of infants, advances of medical science in conquering many childhood diseases, an increase in general medical knowledge, and better facilities for medical care.

As a means for improving health practices, Miss Jean advocated teaching respect for scientific knowledge, especially in the secondary schools. In addition to respect for knowledge, an emotional stimulus is required to create a desire in the student to apply that knowledge as a health practice. Health educators were advised to study the techniques of large commercial advertisers who so adeptly create a desire on the part of the consumer for a particular product. It is Miss Jean's contention that such commercial techniques translated to the health field may pay dividends in bringing about a greater desire for better health habits.

Now It's "Perception"

We not only perceive things in terms of our own past experiences, but information alone is not strong enough to change our perceptions if they appear contrary to our experiences, health educators concluded at a demonstration-discussion sponsored by the Committee on Research and Evaluation of the Public Health Education Section.

The demonstration was of a visual perception device from the Ames-Cantrill laboratories at Princeton and Dartmouth Universities. The discussion, led by Andie L. Knutson, Ph.D., of the Division of Public Health Education, PHS, suggested that a clearer understanding of the principles of perception might help public health workers understand why a cancer patient who knows the seven signs of cancer never applies them to himself, or why there is great difficulty in getting executive boards or committees interested in health programs. Educators say, "We must start where people are." How can they find out where people are? What are the perceptions which groups have of each other? How do assumptions about health educators, doctors, teachers, and other classifications of people handicap perceptions and action?

It was pointed out that many perceptions, including those of health educators, are involved in any community situation. Change, or the prospect of it, usually arouses feelings of insecurity and discomfort and may produce resistance. The group asked whether health programs are being planned to take this factor into account.

INTERPERSONAL RELATIONS

Charts Are Communication Channels

Nearly 1,000 members and fellows at the APHA's first special session of the 1950 meeting participated in a spontaneous group presentation of problems involved in everyday staff relationships and learned that a preconference institute on interpersonal relations had concluded:

That organization charts ought not to be used as indicating status or authority. They are really maps for communication. Once the communication is established everyone in the organization is at the same level. The only person who knows all about his own job, whether it be the janitor or the health officer, is the man who holds it. The dignity of each person is equal to that of every other worker, no matter what profession or training.

That everyone looks at problems differently and that these different views are the result of personal experience and of training. These must be taken into account for mutual understanding.

That the aim of the study of interpersonal relations is not to eliminate problems, but rather to recognize them and appreciate them as evidence of change that might lead to progress.

From official and voluntary health agencies about 100 physicians, nurses, engineers, health educators, sanitarians, psychologists, and administrators participated in the 2½-day institute directed by Paul Lemkau, M.D., Director of the Mental Hygiene Study at the School of Hygiene and Public Health, Johns Hopkins University. The focus was on group discussion, initiated by a sociodrama, and included formal lectures by Dr. Jules Coleman of the Institute of Human Relations, Yale University, and Professor B. A. Lindberg of the Graduate School of Business Administration, Harvard University. The report included a sociodrama by members of the institute, audience participation in problem analysis, and discussion of audience questions by a panel of institute members.

HEALTH COUNCILS

1,200 Health Planning Groups

The extent of community health planning groups—some 1,200 in 2,843 counties surveyed—was reported to the Conference of Health Council Work by Thomas D. Dublin, M.D., Executive Director of the National Health Council.

He reported on a county-wide study by the National Health Council which was carried out in cooperation with the American Medical Association, the American National Red Cross, Community Chests and Councils, and the National Organization for Public Health Nursing, among the national organizations, and with a number of State agricultural extension services, health departments, and tuberculosis associations.

Dr. Dublin said the study revealed 34 State health councils in 31 States organized for the purpose of studying the health needs of their States and for planning and promoting measures and programs to meet those needs. There are 445 independent multicounty, county, city, district, and neighborhood councils. These are associations of official and voluntary local organizations interested in health, and individual citizens organized independently or with groups to study and meet local health needs.

The survey indicated the existence of 240 local public health advisory councils and committees, and 220 health sections, divisions, or committees of multicounty, county, and city community planning bodies. There are some 285 other community, welfare, citizens' and similar councils without specifically constituted health sections which concern themselves with community health planning in broad aspects.

Philip E. Nelbach, Associate Director of the National Health Council, described the reasons for formation of State health councils. There are five main ones, he said: fact finding, arousing public support, need for active citizen interest, need for common planning, and reluctance to lose wartime gains in cooperative efforts.

Samuel Peskin, Research Fellow of the National Health Council, presented findings of a study of independent health councils, their background, structure, and functions. He said that independent councils have most frequently been established in communities of smaller size and with predominately rural populations. Organization of independent councils showed a marked rise from 1935 to 1945, and a very sharp rise since 1945, he said.

Environmental Health

A NEW CONCEPT

Whole Continent of Unfinished Business

It is time to take new bearings and to reset our course—after the example of Shattuck and his associates a century ago—and to realize that our strategic objective in public health today is not so much a mere shift in emphasis but a new concept of health, Mark D. Hollis, C.E., Assistant Surgeon General and Chief Sanitary Engineer, PHS, told the Engineering Section and the Conferences of Municipal Health Engineers and State Sanitary Engineers.

He pointed out that the primary public health problems of the first part of this century, communicable diseases, are now under reasonable control. Now we can think in positive terms of protecting and promoting the health and vigor of the individual and the community. This modern concept of health concerns all the relations of man with his environment—his natural surroundings, his diet, his housing, his working and travel conditions, his recreation—all of the physical give-and-take between the individual and the world which gives him his life. The resources of the health professions, the sociologists, and the educators, and the health departments of all our branches of government find a natural alliance in this concept.

Sanitation—a Universal Necessity

The concept of environmental health rests on the essentials of existence—man's need for and man's use of air, water, food, and shelter. The protective lining of this foundation is sanitation. It is the one health necessity that is universal. The problems of sanitation are common to all peoples. Difference among areas are not differences of kind, but only differences in complexity.

Despite great achievement in the past 50 years, there lies before us a whole continent of unfinished business. To our credit, Mr. Hollis noted, some intelligence has been shown about clearing a few health barriers ahead of orderly national growth. This was true in municipal water supply and liquid waste collection, of action against insect-borne diseases, and of attacks on animal-borne diseases communicable to man.

But there is no cause for complacency in the history of milk sanitation, shellfish sanitation, and sanitation of bathing waters, nor are there grounds for congratulations on the national record of controlling water pollution, on school and institutional sanitation, and unsolved questions of food sanitation. What, Mr. Hollis asked, is the national plan on air pollution, including control of irritating pollens? And what about the hygiene of housing and home accident prevention? What do we know about unhealthful aspects of faulty community planning of substandard recreational facilities, and abnormal noise. Most certainly rural sanitation cannot be viewed with pride, Mr. Hollis felt, when more than 25 million of the rural population who have been able to obtain electric power are still without running water and water-carried waste systems.

Health Not a Statistical Zero

It is merely negative to measure environmental health progress in terms of low mortality or even low morbidity. Environmental health is more than a zero sign on our statistical tables. Today qualitative measures of the environment in which we live, work, and play are needed, Mr. Hollis continued. A measure of general well-being, pride, and confidence must be sought. The National Sanitation Foundation expresses this standard as "a way of life."

Outstanding contributions have already been made to public health by the professions of sanitary engineering, bacteriology, biology, and chemistry. But there are big jobs still ahead. Mr. Hollis noted several:

Sewage Disposal. Perhaps it was an error to disassociate the production and delivery of safe water from the collection and disposal of the inevitable liquid byproduct wastes. Public opinion ordinarily insists upon a satisfactory water supply and upon effective collection of sewage, but has been slow to give funds for the proper treatment of sewage. Could the defect be remedied by a single service charge to cover both the delivery of water and the collection and proper disposal of its waste byproducts?

Stream Pollution. In what we know about treating organic and most chemical waste, we are, as a society, far ahead of what we do. Figuring at 1950 prices, the cities of America need to invest 4½ billion dollars in the next 10 years simply to meet the more obvious needs for sewage treatment works. This is about three times the current rate. Industrial waste treatment needs are about as great.

The idea of "conflicting interests" in the use of natural water resources, Mr. Hollis maintained, suggests a false base. The several legitimate uses of natural waters constitute an "allied interest," with each use entitled to its proper emphasis. That it is impractical and unnecessary to purify waste completely prior to discharge into streams is well known, Mr. Hollis commented. The known natural purification phenomena of surface streams should be utilized to an extent compatible with down stream water uses.

Water pollution control today is a State problem. It should and will remain a State problem provided the States pursue an aggressive policy of remedial action and cooperate fully with each other on problems interstate in character. The Federal activity is geared to supporting the efforts of States.

General Sanitation. Milk and food sanitation suffers from confusion and irregularity. Needs include a uniform ordinance and code, local administration by well-trained personnel, and establishment of some central testing facility for equipment. The 13 million pounds of fluid milk shipped daily in interstate traffic might benefit from application of general techniques which have proved successful in shellfish sanitation. Other pressing problems loom up in industrial hygiene, use of synthetics in food processing, sanitation in public institutions, and in the control of the fly-borne diarrheas and equine encephalitis.

Radiological Health. Eventually, the responsibility of protecting the population against harmful effects of ionizing radiation will fall upon public health officials. A new personality—health physicist—is entering the public health family. Mr. Hollis noted the importance of adding to the long familiar X-ray and other radiological hazards the increasing use of radioactive isotopes—about 4,000 shipments annually. He pointed out the implications of security controls of the Atomic Energy Commission and the importance of the wise administration of "safe" limits of contamination which have been set by the National Committee on Radiation Protection.

The PHS radiological health program has four objectives: (1) To develop a group of experts in radiological health; (2) to furnish State health agencies with pertinent information as it becomes available through security channels, and with consultation on emergency problems; (3) to develop at the Environmental Health Center at Cincinnati a training facility for State and local health personnel; and (4) in collaborating with AEC to carry out essential research, particularly on handling and disposal of radioactive wastes, detection in and decontamination of public water supplies.

Research and Development. Industrialization and urban congestion have created environmental problems which current research and development can scarcely expect to solve within 10 years. PHS, Mr. Hollis noted, is encouraging research through research grants and fellowships, and in direct investigations. If a small percentage of annual appropriations was given by State health departments for research and developmental activities relating to environmental health problems peculiar to their respective locations, the investment would be well warranted.

There is need, also, Mr. Hollis said, for working out machinery for indexing the national research effort that would permit critical review by national associations and other professional groups.

Healthful Housing Vital to National Health

Starting with the congressional declaration in the Housing Act of 1949 "that the general welfare and security of the Nation and the health and living standards of its people . . . require a decent home and a suitable living environment for every American family," engineers and health officers at the APHA probed several aspects of housing and health.

The Surgeon General of the Public Health Service was quoted to the effect that every action to improve the quality of housing has behind it the recognition that the home environment plays a significant role in determining the health status of the individual, the family, and the community. In seeking higher levels of national health an aggressive program for improving the quality of housing is a necessary adjunct to the provision of better health services.

Health Officers and Housing Law Enforcement

During much of our Nation's history of housing reform, health regulations have been a fundamental basis for housing improvement and health officials have played a significant role, Ralph J. Johnson, M.S., Hygiene of Housing Consultant to the Division of Engineering Resources, PHS, said. Although the relation between health and housing has been recognized for more than a century, today it is of greater importance than ever that the health officer appreciate and exercise his role. There has been increased activity by health departments since the end of World War II.

Education of the public regarding housing conditions is the first essential for housing law enforcement. The value of active newspaper support—the Baltimore Sun and St. Louis Post-Dispatch were cited—as well as full use of health education techniques were points emphasized.

Specific information about housing conditions must also be obtained, Mr. Johnson emphasized, in order to provide a basis for policy and action. The APHA Appraisal Method for Measuring the Quality of Housing has now been used by over 30 departments of local government, mostly health departments. More than 150,000 dwellings have been studied. Training in the use of this method is now being given by arrangement with APHA at PHS housing training stations at Atlanta, Ga., and Syracuse, N. Y.

Efficient Administration Essential

Once specific information has been obtained, standards and laws for enforcement can be formulated intelligently. Housing regulations from the public health viewpoint should include standards of health, safety, and amenity for new family dwellings of all kinds and for their environment. Regulations should also cover standards of occupancy and maintenance for existing family dwellings; for trailer camps, dormitories, and rooming houses; and for the extension of suitable controls beyond the built-up areas.

Laws are not self-enforcing. Once they are established the actual accomplishments of enforcement stand or fall on the judgment, the efficiency, and the impartiality with which the laws are administered.

Mr. Johnson suggested that responsibility for administering laws or regulations relating to housing should be centered. Visualized was a board consisting of heads of the departments directly responsible and one or two others vitally concerned. To carry out the job, an adequate budget is necessary, as are competent personnel and means of maintaining their continued interest and efficiency. In-service training and changes in areas of operation were mentioned. Likewise, a systematic scheme of record keeping is essential, he felt.

In the entire enforcement process there must be a truly democratic effort by the administrator to balance coercion against education and persuasion. This process begins with rule making and involves all aspects of enforcement. Persons affected should be given an opportunity to be heard, to present evidence or opinion, and—significantly—to define for the administrator the level of community acceptance. Study of housing law-enforcement problems leads directly to the conclusion that adherence to good administrative legal practices is essential for effective results, Mr. Johnson asserted.

Health Departments Making Progress

Health departments in many parts of the country are making real headway in the promotion of healthful housing, the APHA sections were told. In 2 years, over 2,100 dwelling units have been substantially improved in Baltimore. In Washington, D. C., the health qualities of some 500 dwellings will be improved this year. Progress was reported in Memphis, Atlanta, Miami, Birmingham, and Brookline.

From Los Angeles, Charles L. Senn, Engineer-Director of the Sanitation Bureau of the City Health Department, reported on the use of the APHA Appraisal Method. The factual information it produces is valuable in beginning a housing improvement program. The data are useful not only to the health department, but also to city planning and housing authorities. The information is also recognized as objective evidence in the courts.

From Milwaukee, E. R. Krumbiegel, M.D., Commissioner of the City Health Department, reviewed recent developments and discussed the responsiblities of public health in housing. From St.

Louis, J. Earl Smith, M.D., Health Commissioner, told of the place of the health officer in a coordinated attack on the municipal housing problem by the Health Division, the City Plan Commission, and the Division of Building Inspection. He said action is being focused on individual neighborhoods in need of rehabilitation. After data are evaluated, plans are submitted to residents, property owners, and other interested groups in the particular neighborhood. The final plan, integrating constructive suggestions of the people concerned, will be applied to the neighborhood with the intent of minimizing all the factors which make the area less desirable to live in. The rejuvenation of these neighborhoods will naturally include the repair of deteriorated houses.

AIR POLLUTION

We Know How To Do the Job

Industry and government now have the knowledge necessary for the control of air pollution, and corrective action—backed up by increased research activity—has begun in many plants, Arthur C. Stern and Leonard Greenburg, M.D., of the Division of Industrial Hygiene and Safety Standards, New York State Department of Labor, reported to the Industrial Hygiene Section.

Public and professional interest reached a high in 1950, they said, pointing out that during the past 2 years there has been a consolidation and organization of much scattered existing knowledge that can now be applied. "We know how to do the job," they said, "but frequently have our hands tied when it comes to applying our know-how."

Mr. Stern and Dr. Greenburg reviewed recent developments, noting, among others, findings on fluoride damage to livestock, air-contamination standards, jet dilution of stack effluents, air sampling and analysis. Interpreting data reported by PHS in the case of the Donora smog episode, they concluded that sulfur dioxide was probably the etiological agent.

They also said that industry is more alert to its responsibility to be a good neighbor, and less is heard of the argument that "we were here first and those people knew it when they built their homes near us." They cited as one evidence of this more enlightened attitude the recent sponsorship by the American Iron and Steel Institute of an air-pollution study by the Industrial Hygiene Foundation of America to include steel mill processes and the atmospheric contaminants they emit.

In the field of administrative regulation, Mr. Stern and Dr. Greenburg saw as the immediate task the coordination of the efforts of city, county, and State administrative groups. Last year, both the New Jersey and Maryland legislatures authorized air-pollution studies, and three air-pollution bills were introduced in the 81st Congress. It is highly likely that cities and counties throughout the country will make their air-pollution-control regulations more stringent. They will have to rely heavily on their local and State public health officials for leadership and guidance.

Micro-Meteorology Developments

Another field in which much progress was reported is meteorology, particularly in study of the types of small-scale weather phenomena necessary to the solution of local air-pollution problems. Edward M. Brooks, Sc.D., Associate Professor of Geophysics of St. Louis University, pointed out that industrial hygiene and meteorology are connected through their relationships to air pollution both inside and outside of industrial plants, and that quantitative relationships between meteorology and industrial hygiene can be determined by gathering and correlating statistical data.

During a normal weather sequence, he reported, the worst pollution generally occurs just after the passage of a high pressure area. This is characterized by light winds, warm dry air aloft, and no precipitation. Pollution is worst in small valleys with steep walls, usually during the fall. Maximum pollution usually occurs between sunrise and noon because of the mixing of surface air with polluted air aloft, the arrival of a polluted sea breeze in coastal cities, photochemical effects of sunlight, or the commencement of plant operations.

WATER RESOURCES

Conservation by Pollution Control

Members of the Engineering Section concerned with problems of water pollution control heard four reports dealing with broad issues of water resources. W. W. Horner, Consulting Engineer with Horner and Shifrin of St. Louis, reported on the development of "A Statement of Desirable Policy with Respect to the Conservation, Development, and Use of the National Water Resources" which has been filed with the President's Water Resources Policy Commission.

Conservation by pollution control was discussed by Edward J. Cleary, Executive Director and Chief Engineer of the Ohio River Valley Water Sanitation Commission. The Missouri River Basin plan was reported by George S. Knapp, Chief Engineer of the Division of Water Resources of the Arkansas State Board of Agriculture.

Legislation and control measures increasingly have been directed toward conserving the national asset of clean, adequate water resources, Louis F. Warrick, Chief of the Technical Services Branch, PHS, Division of Water Pollution Control, observed. Basically, the success of any program of water pollution control rests on the ability and willingness of municipalities, industries, and others to carry out the details of such a program. There are many technical, legal, and economic aspects to be considered. Close harmony—teamwork—is indicated.

Mr. Warrick said that estimates of over-all national needs show that some 6,000 new treatment plants, replacements, extensions, or enlargements are necessary. He noted that while joint treatment of municipal and industrial wastes has been possible, some industrial wastes interfere with the usual biological methods. Industrial wastes often need separate attention, and in this field additional research is important. He reported on action in this and related areas by the National Technical Task Committee on Industrial Wastes which was set up in May 1950 by PHS under the Federal Water Pollution Control Act.

HOME ACCIDENTS

Deadlier Than Disease

Accidents kill 15 times as many children as die of poliomyelitis in nonepidemic years, and deaths and injuries from accidents in all ages are 60 times greater than for poliomyelitis, Leona Baumgartner, M.D., Assistant Commissioner of Health for New York City and Consultant to the Children's Bureau, told a session on home accident prevention arranged by the Subcommittee on Accident Prevention of the Committee on Administrative Practice.

Dr. Baumgartner contrasted the intense interest over poliomyelitis with the relative complacence toward accident fatalities and noted that there is more that can be done about preventing accidents than about preventing the disease. Accidents kill more children over 1 year of age than any single disease, she reported. They are fatal also to more children from 1 to 14 than all the diseases combined, including poliomyelitis, scarlet fever, diphtheria, meningitis, diarrhea and enteritis, measles, pneumonia, and whooping cough.

Prevention Reduces Death Rate

Speaking on a home accident prevention research project in Kalamazoo, Mich., Winston B. Prothro, M.D., Medical Director of the City-County Health Department, said that during the first year

(1949) the death rate dropped from a 15-year average of 27.2 to 21.0, the lowest rate ever recorded for the community.

Dr. Prothro said the health department, with financial support from the W. K. Kellogg Foundation, began a 3-year research program on home accident prevention on January 1, 1949, based on five major objectives: To demonstrate the possibility of bringing about a significant reduction in home accident mortality and morbidity rates; to define the most practical and effective home-safety programs for local health departments; to develop an awareness in the community of the need for and value of home-safety programs; to experiment with activities and techniques not previously attempted in this field; to explore contributions that can be made by official and volunteer agencies in a community and to demonstrate agency coordination.

The New Start in Oregon

In 1948 accidents killed 50 percent more Oregonians than all communicable diseases combined, and roughly 30 percent of these accidental deaths were in the home, Harold M. Erickson, M.D., State Health Officer, said. Describing the State-wide, coordinated program, he said that in Oregon two very strong beliefs have developed about home accident prevention efforts. The first is that a real home accident prevention program cannot be developed without knowing what the problem really is. Second, the old saw about the three E's of safety—education, engineering, and enforcement—is obsolete. The "M" for medical must be added, he asserted.

"We can educate, and engineer, and enforce forever, but still lose countless lives because of faulty vision, poor hearing, or other impairments. There is a medical and a public health responsibility," he emphasized. Dr. Erickson then explained that a pilot program is being conducted in a representative county to develop information and techniques applicable to a State-wide prevention program.

Instruction for Older Persons

Older people are more likely to suffer accidents because with age come degenerative diseases which produce faulty coordination, impaired vision, faulty hearing, emotional changes, bone and muscular debilities, and disturbances in the deep reflexes, James H. Ready, M.D., Medical Director of the General American Life Insurance Co., noted. Many minor accidents in the home are disabling or fatal to old people. He listed typical mishaps in the home as stumbling over objects on steps, slipping on throw rugs insecurely fixed to highly polished floors, slipping in bathtubs which do not contain rubber suction mats, bumping into or falling over chairs and other obstacles in dark passageways.

Dr. Ready said the medical profession should assume the responsibility for instructing older patients on the precautions which must be taken to avoid home accidents, and keep alert for early degenerative diseases and immediately institute treatment to allay their rapid progression. Early detection and control of degenerative disease is a paramount factor involved in preventing serious accidents and their complications, he concluded.

INDUSTRIAL HYGIENE STATISTICS

11½ Years More Life for Workers

In little more than a generation, 11½ years have been added to the industrial workers' life expectancy at age 20, Louis I. Dublin, Ph. D., Second Vice President and Statistician of Metropolitan Life Insurance Co., reported to the Industrial Hygiene and Statistics Sections in a discussion of the application of statistical procedures to industrial hygiene.

In the past 40 years, Dr. Dublin said, longevity has increased more rapidly among industrial wage earners than among other workers. In 1911–12 the expectation of life among white male industrial policyholders at age 20 insured by the Metropolitan Life Insurance Co. was nearly 6 years less than that for white males of the same age in the general population. At present, the industrial policyholders fall short by only 1 year. An industrial wage earner aged 20 starting out on his career today can look forward to 48.4 additional years of life. About 40 years ago, an average worker of that age might have expected to live only 36.87 additional years. Influences contributing to this longevity are the development of industrial medicine, the passage of workmen's compensation legislation, the reduction of hours of labor, and improvements in the economic status of the worker, together with benefits from general advances in medical science and sanitation.

Sickness Records

Poor management practices, poor scheduling, and a feeling of job insecurity, as well as poor environmental working conditions, are reflected in sickness absenteeism records, W. G. Hazard, of the General Industrial Relations Division, Owens-Illinois Glass Co., Toledo, Ohio, told the meeting. He pointed out the need to look for variations between plants and departments within each company, and described results of sickness absenteeism studies conducted in 15 plants, employing over 17,000 people.

The great lack of industrial morbidity and mortality data in the United States and the limited applicability of existing data was reemphasized by Victoria Trasko of the Division of Industrial Hygiene, PHS. Current material of use to divisions of industrial hygiene on occupational diseases consists, she said, of officially reported cases, data uncovered in scientific studies of health hazards, and independent accounts of disease experience. Material on over-all disabling sickness is found in previous general sickness surveys and in the records of sick benefit and group insurance organizations. New sources of morbidity and mortality material are the pilot study on reporting of occupational diseases currently conducted by the PHS Division of Industrial Hygiene, and the proposed occupational and industrial mortality study of the PHS National Office of Vital Statistics. A potential source may be in the records kept in connection with State disability insurance programs.

A statistical program in industrial hygiene, consisting of services for the development and guidance of the program and services to plants, was discussed by Ruth R. Puffer, Dr.P.H., and Sara Lou Hatcher, M.A., of the Tennessee Department of Public Health, who emphasized that a practical statistical program should contribute materially to the development and extension of industrial hygiene programs.

INDUSTRIAL NUTRITION

Need More Research in Plant Feeding

The urgent need for more work in the field of nutrition in industry and especially for research into the direct relationship of food and the effects of toxic materials was emphasized at a joint session of the Food and Nutrition and Industrial Hygiene Sections.

Both Maurice E. Shils, Sc.D., Assistant Professor of Nutrition at Columbia University School of Public Health, and Frank Princi, M.D., of the Kettering Laboratories of Applied Physiology, University of Cincinnati College of Medicine, discussed the existing data on toxicity and nutrition. Approaching the problem from the viewpoint of protecting the industrial worker, Dr. Shils said, two main questions present themselves from our existing knowledge: First, is there adequate evidence for accepting the viewpoint that nutritional factors can influence susceptibility to toxic agents, and second, are the requirements for any nutritional factors raised by exposure to such agents? Dr. Princi emphasized the scarcity of our knowledge at present, the need for specific research, and the importance of good general nutritional habits in relation to occupational exposures.

In time of national emergency special efforts should be made by all industrial groups and departments of health to recognize the hazard of poor nutrition and the potentials of outbreaks of active food poisoning and infections, Margaret P. Zealand, Nutritionist for the New Jersey State Department of Health, said. She reported on in-plant feeding programs, finding that improper meals served to workers are often responsible for a great loss in productivity. Except in a few instances, her surveys indicated, industrial plants have been too preoccupied to take an active interest in workers' nutritional problems.

FROZEN FOODS

Nutritive Values Can Be Maintained

Research indicates that the nutritive values of frozen fruits and vegetables can be retained during preparation and marketing by controlling microorganisms and enzymic and chemical actions, Donald K. Tressler, Ph.D., Consulting Food Technologist of Westport, Connecticut, and Carl S. Pederson, Ph.D., Professor of Bacteriology at the State Agricultural Experiment Station, Cornell University, told the Food and Nutrition and Laboratory Sections.

The approximate number of microorganisms in frozen fruits and vegetables is important because it indicates the condition of the food before it was processed. It also is evidence of the degree of promptness with which the food was handled, sanitary practices, and possible growth of organisms prior to freezing. Drs. Tressler and Pederson said high counts thus should reveal to control officials and processors any gross contamination which in itself may not be serious but which may become so if allowed to continue.

Viable Bacterial Cells Found

Dorothy L. Hussemann, Ph.D., Associate Professor of Home Economics at the University of Wisconsin, reported that all of the frozen precooked food examined during her studies contained viable bacterial cells, but the number per gram varied greatly. Chicken à la king showed the greatest contamination, she said. Beef stew and creamed fish also were examined in the course of the study. Dr. Hussemann said cooking reduced the number of microorganisms but did not sterilize the food, and when food was stored in a refrigerator, subsequent to cooking, bacteria multiplied in a majority of the cases.

The Food and Nutrition and Laboratory Sections also heard discussion of "Studies on Frozen Concentrated Milk and on the Effects of Surface-Active Agents on Reconstituted Milk."

In a report on two studies carried out at the Naval Medical Field Research Laboratory at Camp Lejeune, N. C., where he is head of the Epidemiology and Sanitation Section of the Department of Preventive Medicine, Lt. Commander Leon P. Eisman, M.S.C., U.S.N., said fresh fluid milk was concentrated to approximately one-third its original volume without the application of any more heat than is required for pasteurization. Moreover, the milk was frozen and stored for long periods without deteriorating, and was capable of being reconstituted to a product indistinguishable from fresh fluid milk.

SANITATION

Home Garbage Grinders Under Study

The engineering, legal, and operational aspects of use of household grinders on a mass scale for disposing of garbage were described by Blucher A. Poole, Director of the Bureau of Environmental Sanitation, Indiana State Board of Health, before the Engineering Section.

Mr. Poole discussed highlights of the Jasper, Ind., project, where mass installation of household grinders has almost supplanted the conventional methods of garbage collection and disposal. He said the project is being studied by PHS and the Indiana State Board of Health for its effect on the general sanitation of the community.

Poultry Practices Need Improvement

Disease outbreaks attributable to poultry and poultry dishes are the result mainly of poor sanitation practices, R. J. Helvig, D.V.M., and Sanitary Engineer Russell W. Hart, both of PHS, reported to the Engineering Section. They said that of 9,962 cases of disease traced to foods other than milk in 1948, 2,492 were attributable to poultry and poultry dishes.

Dr. Helbig and Mr. Hart underscored the need for proper sanitation practices in the poultry industry by pointing out that in 1939 poultry constituted the greatest reservoir of paratyphoid infection among domestic animals in the United States. The PHS Recommended Ordinance and Code Regulating Eating and Drinking Establishments offers a pattern, they felt, which States and municipalities might follow in developing sanitation provisions for a model poultry inspection ordinance, adding that it was applicable to a large extent to poultry dressing plants and paves the way for reciprocal inspection.

Free Iodine as Sanitizing Agent

The potency of free iodine when used as a sanitizing agent for eating utensils was discussed by Louis Gershenfeld, D.Sc., and Bernard Witlin, D.Sc., of the Department of Bacteriology, Philadelphia College of Pharmacy and Science, before the Laboratory Section. They reported on testing techniques which demonstrated that 100 ppm of free iodine can kill *E. coli* within 1 second. They recommended a 200 ppm solution, however, for the routine sanitization of eating utensils, especially those used in sickrooms.

Pullorum Transmissible to Man

Pullorum disease, common in poultry, is transmissible to man, in whom it produces a dysentery-like disease, and its germ is found in eggs, certain tissues, and droppings of infected birds, Henrik J. Stafseth, Ph.D., Head of the Department of Bacteriology and Public Health, Michigan State College, told the Laboratory Section.

The infecting organism, *Salmonella pullorum*, was found in eggs stored at 4° C. for 5 months, and in 9-month stored eggs at 25° C. The organism, Dr. Stafseth and his associates (Margaret M. Cooper, M.S., and Alfred M. Wallbank) reported, was not always destroyed by the usual methods of cooking. Boiling, frying, and poaching were ineffective; scrambling, however, resulted in 100 percent kill after 1½ minutes over the fire.

VECTOR CONTROL

DDT Dusting Effective in Typhus

Incidence of human cases of murine typhus fever, prevalence of complement-fixing antibodies in the domestic rat reservoir, and the abundance of rat fleas were significantly reduced as a result of county-wide DDT dusting of rat runs and harborage, said Elmer L. Hill, M.D., M.P.H., of the New York State Health Department; and Harvey B. Morlan, M.S., Bernice C. Utterback, and Joseph H. Schubert, Ph.D., of the PHS Communicable Disease Center.

They reported on a quantitative evaluation of DDT dusting as a procedure in murine typhus control in county-wide treatment of two counties in southern Georgia. Favorable results have persisted for 2 years in the project counties. A clean-up drive in the county seat of the "untreated county" did produce a significant reduction in human incidence in that one town during 1947.

A moderate rise in prevalence of murine typhus complement-fixing antibodies in the domestic rat reservoir in the two treated counties in 1949 accompanied by a moderate increase in abundance of rat fleas suggests the necessity for further surveillance, they said, holding, however, that the rationale of including DDT dusting procedures in the murine typhus control program is supported by the findings of this evaluation study.

Infections of Rocky Mountain spotted fever occurring in mammalian hosts of the vectors are transitory and mild or inapparent, although such hosts may serve as transient reservoirs, John K.

Miller, M.D., Associate Director of the Division of Laboratories and Research, New York State Department of Health, said. Uninfected feeding ticks may ingest pathogenic rickettsiae if an infected tick, feeding simultaneously on the same host, inoculated rickettsiae into the host's blood.

Epidemiological and laboratory aspects of brucellosis were discussed by Sir Weldon Dalrymple-Champneys, Deputy Chief Medical Officer of the Ministry of Health, London. Reviewing the problems, he noted that in 1929 only 14 cases of brucellosis of endemic origin had been described in England and Wales, while this year he was able to report on a series of 983 cases collected in intervening years. He discussed, among other aspects, the agglutination test, noting its desirability at regular intervals on the blood serum of persons in groups exposed or likely to be exposed to *Brucella* infection. Also discussed were blood cultures and intradermal tests.

VETERINARY MEDICINE

Emergency May Increase Animal Diseases

The veterinarian—no less than the physician, the nurse, the engineer, and the bacteriologist—has an important contribution to make in the total health effort, the Conference of Public Health Veterinarians was told at APHA.

Veterinary medicine and control activities will be an important factor during a national emergency, Frank A. Todd, D.V.M., M.P.H., of the Veterinary Corps, U. S. Army, said in predicting that an increase of animal-borne disease may be anticipated. The factors to which this may be attributed, he felt, included the confusion that may exist in disease-control agencies during general mobilization. Also, the movement of troops and equipment and animals through disease-infected areas during maneuvers may act as a means of spread.

New Diseases May Be Introduced

Returning troops and equipment from foreign countries where various devastating animal diseases exist could introduce new diseases into this country, Lt. Col. Todd said, and clandestine activities of spreading of current infections or introducing exotic ones should not be overlooked. He reviewed the experiences of military veterinary services overseas, and pointed out areas of development and activity in this country.

From the point of view of agriculture, Clarence W. Pals, D.V.M., Assistant Chief of Meat Inspection Services, U. S. Department of Agriculture Bureau of Animal Industry, noted that poorly nourished, parasitized or diseased herds and flocks produce little acceptable meat, milk, or eggs.

Dr. Pals reviewed animal disease control accomplishments and said that veterinarians must remain alert to prevent the entrance of new or foreign diseases into this country and to control or eradicate those diseases which are a threat to our livestock economy.

Integration With Public Health

James H. Steele, D.V.M., Chief of Veterinary Public Health Services of the Communicable Disease Center, PHS, pointed out that in an era when professional isolationism is losing much of its glamour it seems particularly appropriate to stress the essential unity of all public health activities and to recognize the value of veterinary medicine which is integrated with other preventive health programs.

During World War II, he noted, diseases like Q fever in southern Europe, Japanese B encephalitis in the Pacific Theater, Venezuelan encephalomyelitis in Trinidad, glanders and pseudo-glanders in China and southeast Asia arose as new problems that required the integration of veterinary medicine into preventive medicine. Diseases now under cooperative study are rabies, brucellosis, creeping eruption, salmonellosis, leptospirosis, Q fever, and trichinosis.

In the PHS, Dr. Steele reported, veterinary medicine has participated in communicable disease control, with primary emphasis on the control of animal diseases transmissible to man; in research; in sanitation, especially as it pertains to food products of animal origin; in administration of interstate quarantine regulations that relate to animals; and in liaison with Federal and State veterinary agencies, professional associations, and practitioners.

Incidence of Disease

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

Reports From States for Week Ended November 18, 1950

Whooping Cough

A total of 2,052 cases of whooping cough was reported in the United States for the current week as compared with 2,140 for the same week of 1949, and a 5-year median of 2,140. The total number of cases reported for the "disease" year beginning October 1 is 11,426 as compared with 10,797 for the previous year.

Influenza

A total of 2,219 cases of influenza was reported for the current week. About three-fourths of this total was reported in two States, Virginia and Texas.

Comparative Data for Cases of Specified Reportable Diseases: United States

[Number after diseases are International List numbers, 1948 revision]

Disease	Total for week ended—		5-year median 1945-49	Seasonal low week	Cumulative total since seasonal low week		5-year median 1944-45 through 1948-49	Cumulative total for calendar year		5-year median 1945-49
	Nov. 18, 1950	Nov. 19, 1949			1949-50	1948-49		1950	1949	
Anthrax (062)	1	2	(1)	(1)	(1)	(1)	(1)	41	47	(1)
Diphtheria (055)	177	254	358	27th	2, 180	3, 170	4, 214	5, 308	6, 938	10, 511
Acute infectious encephalitis (082)	29	21	7	(1)	(1)	(1)	(1)	886	708	579
Influenza (480-483)	2, 219	2. 366	2, 162	30th	20, 433	16, 487	17, 078	266, 692	92, 354	160, 158
Measles (085)	1, 863	1, 602	1, 696	35th	10, 674	7, 656	10, 258	298, 845	596, 174	569, 190
Meningococcal meningitis (057.0)	55	65	65	37th	537	516	516	3, 336	3, 032	3, 070
Pneumonia (490-493)	1, 146	1, 524	------	(1)	(1)	(1)	(1)	[2] 72,181	68, 639	------
Acute poliomyelitis (080)	958	733	463	11th	[3] 29,628	39, 590	23, 427	[3] 30,759	40, 503	23. 894
Rocky Mountain spotted fever (104)	3	2	2	(1)	(1)	(1)	(1)	449	555	514
Scarlet fever (050)	1, 097	1, 295	1, 586	32d	8, 300	8, 866	11, 498	48, 470	66, 532	72, 892
Smallpox (084)	------	------	------	35th	3	4	6	29	45	153
Tularemia (059)	9	15	15	(1)	(1)	(1)	(1)	793	994	847
Typhoid and paratyphoid fever (040, 041) [4]	54	62	65	11th	2, 645	3, 103	3, 103	3, 154	3, 591	3, 591
Whooping cough (056)	2, 052	2, 140	2, 140	39th	11, 426	10, 797	11, 699	108, 621	57, 399	87, 574

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[1] Not computed.

[2] Additions: Tennessee and Texas, week ended Nov. 11, 68 and 9 cases respectively.

[3] Deductions: Michigan, weeks ended Sept. 30 and Oct. 21, 1 case each; Georgia, week ended Nov. 11, 3 cases· Arkansas, week ended Oct. 28, 1 case; Texas, week ended Nov. 11, 9 cases.

[4] Including cases reported as salmonellosis.

In August an influenza-like disease appeared in Honolulu and rural areas of Oahu; by the end of September cases were recognized on Molokai; and in October on the Island of Hawaii there was a total of 263 reported cases. Five of nine pairs of serum showed a significant antibody rise for type A influenza virus when examined by the regional laboratory at Berkeley, Calif. In the opinion of the epidemiologist of the board of health, the infection may have been introduced by a troopship from Japan in July as there was an unusual incidence of respiratory illness on board and subsequently among the Federal inspectors who boarded the ship at Honolulu. In view of an antibody rise for type A influenza virus in several persons suffering from an influenza-like disease in Hawaii, a report of 544 new cases for the current week suggests the occurrence of an outbreak of type A influenza in that area.

Other Diseases

There was an increase of poliomyelitis cases (958) reported as compared with the previous week (890) and 733 for the same week last year. Corrections in four States (Arkansas, Georgia, Michigan, and Texas) reduced the total for the previous week from 902 to 890. The total number for the present "disease" year is now 29,628 as compared with 39,590 for last year. There were increases over the previous week in reported cases of all the diseases except for meningococcal meningitis which decreased from 74 last week to 55, and smallpox for which no cases were reported. One case of anthrax was reported in Pennsylvania.

Deaths During Week Ended November 18, 1950

	Week ended Nov. 18, 1950	*Corresponding week, 1949*
Data for 94 large cities of the United States:		
Total deaths	8, 990	9, 874
Median for 3 prior years	9, 257	
Total deaths, first 46 weeks of year	420, 622	421, 089
Deaths under 1 year of age	663	686
Median for 3 prior years	686	
Deaths under 1 year of age, first 46 weeks of year	28, 691	30, 065
Data from industrial insurance companies:		
Policies in force	69, 639, 076	70, 047, 254
Number of death claims	12, 904	12, 813
Death claims per 1,000 policies in force, annual rate	9. 7	9. 5
Death claims per 1,000 policies, first 46 weeks of year, annual rate	9. 2	9. 1

Reported Cases of Selected Communicable Diseases: United States, Week Ended Nov. 18, 1950

[Numbers under diseases are International List numbers, 1948 revision]

Area	Diphtheria (055)	Encephalitis, infectious (082)	Influenza (480-483)	Measles (085)	Meningitis, meningococcal (057.0)	Pneumonia (490-493)	Poliomyelitis (080)
United States	**177**	**29**	**2,219**	**1,863**	**55**	**1,146**	**938**
New England	**5**	**1**	--------	**58**	**2**	**42**	**28**
Maine	1	--------	--------	2	--------	1	3
New Hampshire	1	--------	--------	--------	--------	--------	--------
Vermont	--------	--------	--------	12	1	--------	--------
Massachusetts	3	1	--------	29	--------	--------	12
Rhode Island	--------	--------	--------	1	--------	--------	1
Connecticut	--------	--------	--------	14	1	41	12
Middle Atlantic	**8**	**4**	**5**	**351**	**8**	**371**	**150**
New York	6	2	[1] 5	133	4	274	106
New Jersey	1	2	--------	75	1	37	25
Pennsylvania	1	--------	--------	143	3	60	19
East North Central	**9**	**6**	**23**	**524**	**11**	**104**	**262**
Ohio	2	--------	3	114	3	--------	67
Indiana	--------	1	1	9	--------	7	31
Illinois	2	3	--------	134	4	58	61
Michigan	4	--------	--------	70	2	31	67
Wisconsin	1	2	19	197	2	8	36
West North Central	**5**	**6**	**6**	**127**	**1**	**47**	**128**
Minnesota	3	4	1	18	--------	9	49
Iowa	1	--------	--------	5	--------	3	17
Missouri	--------	1	1	68	--------	16	13
North Dakota	--------	1	3	20	1	16	--------
South Dakota	1	--------	--------	7	--------	--------	18
Nebraska	--------	--------	--------	1	--------	--------	19
Kansas	--------	--------	1	8	--------	3	12
South Atlantic	**54**	**3**	**318**	**73**	**10**	**126**	**122**
Delaware	1	--------	--------	4	--------	--------	--------
Maryland	2	1	1	--------	2	16	20
District of Columbia	--------	--------	--------	--------	--------	16	4
Virginia	11	1	198	20	3	29	29
West Virginia	2	1	81	39	3	20	11
North Carolina	15	--------	--------	6	1	--------	9
South Carolina	4	--------	21	1	--------	11	9
Georgia	18	--------	17	--------	--------	15	23
Florida	1	--------	--------	3	1	19	17
East South Central	**51**	**1**	**42**	**177**	**8**	**65**	**29**
Kentucky	14	--------	--------	127	1	19	7
Tennessee	13	--------	19	20	3	--------	13
Alabama	12	--------	18	5	1	19	6
Mississippi	12	1	5	25	3	27	3
West South Central	**40**	**2**	**1,641**	**146**	**6**	**311**	**68**
Arkansas	5	--------	107	49	1	34	13
Louisiana	3	--------	1	3	--------	10	13
Oklahoma	3	--------	70	10	1	13	6
Texas	29	2	1,463	84	4	248	36
Mountain	**2**	**1**	**174**	**184**	**3**	**44**	**23**
Montana	--------	--------	20	5	1	--------	2
Idaho	--------	--------	8	20	--------	5	5
Wyoming	1	--------	--------	3	--------	--------	1
Colorado	--------	--------	9	133	--------	10	10
New Mexico	--------	--------	1	5	1	4	6
Arizona	1	1	136	10	1	25	1
Utah	--------	--------	--------	6	--------	--------	--------
Nevada	--------	--------	--------	2	--------	--------	--------
Pacific	**3**	**5**	**10**	**223**	**6**	**36**	**146**
Washington	--------	--------	--------	46	2	--------	36
Oregon	1	--------	4	12	1	15	20
California	2	5	6	165	3	21	90
Alaska	--------	--------	--------	--------	--------	--------	2
Hawaii	--------	--------	544	1	--------	--------	2

[1] New York City only.
Anthrax: Pennsylvania, 1 case.

Reported Cases of Selected Communicable Diseases: United States, Week Ended Nov. 18, 1950—Continued

[Numbers under diseases are International List numbers, 1948 revision]

Area	Rocky Mountain spotted fever (104)	Scarlet fever (050)	Smallpox (084)	Tularemia (059)	Typhoid and paratyphoid fever [1] (040, 041)	Whooping cough (056)	Rabies in animals
United States	3	1,097		9	54	2,052	105
New England		94			2	378	
Maine		8			1	68	
New Hampshire						15	
Vermont		3				95	
Massachusetts		65				99	
Rhode Island		4				65	
Connecticut		14			1	36	
Middle Atlantic		108			6	307	33
New York		[2] 46			2	123	33
New Jersey		24				115	
Pennsylvania		38			4	69	
East North Central		283		2	7	432	6
Ohio		101			2	70	2
Indiana		15		2		29	
Illinois		37			4	39	1
Michigan		113			1	118	3
Wisconsin		17				176	
West North Central		66		3	3	159	7
Minnesota		16			1	14	3
Iowa		13				22	4
Missouri		15		3	1	37	
North Dakota						3	
South Dakota		1				1	
Nebraska		6				7	
Kansas		15			1	75	
South Atlantic	2	149		1	8	217	12
Delaware		2				2	
Maryland		4				35	
District of Columbia		10				1	
Virginia	1	17		1	1	45	
West Virginia	1	16			1	25	1
North Carolina		70				64	
South Carolina		5				4	7
Georgia		19			5	20	4
Florida		6			1	21	
East South Central		133		2	8	129	14
Kentucky		52			2	27	8
Tennessee		60		1	3	23	4
Alabama		14				63	1
Mississippi		7		1	3	16	1
West South Central	1	65			9	214	32
Arkansas	1	8			2	46	2
Louisiana		2			2	4	
Oklahoma		14			1	21	2
Texas		41			4	143	28
Mountain		43		1	4	118	
Montana		8				32	
Idaho		3			1	12	
Wyoming		1					
Colorado		5				24	
New Mexico		6			3	2	
Arizona		3				43	
Utah		17		1		5	
Nevada							
Pacific		156			7	98	1
Washington		32				31	
Oregon		6			1	8	
California		118			6	59	1
Alaska						1	
Hawaii		1					

[1] Including cases reported as salmonellosis.
[2] Including cases reported as streptococcal sore throat.

FOREIGN REPORTS

CANADA

Reported Cases of Certain Diseases—Week Ended Nov. 4, 1950

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Brucellosis					2	1					3
Chickenpox	2		56		147	206	47	99	71	170	798
Diphtheria					3			3			6
Dysentery, bacillary					9	8				6	23
German measles			1		1	45	1	16	7	10	81
Influenza			30				7				37
Measles			6		141	444	24	24	11	211	861
Meningitis, meningococcal	1		1			2					4
Mumps	15		3		87	171	22	60	115	97	570
Poliomyelitis						6		6	3	3	18
Scarlet fever	4		4		55	22	18	9	58	48	218
Tuberculosis (all forms)	6		3	16	81	21	6	12	2	26	173
Typhoid and paratyphoid fever	1			1	9	1				3	15
Venereal diseases:											
Gonorrhea	4		5	4	77	56	25	19	39	58	287
Syphilis	6		11	1	44	17	5	14	6	4	108
Primary	1			1	4	1		3	1		11
Secondary	3				3	2		2	1		11
Other syphilis	2		11		37	14	5	9	4	4	86
Whooping cough	2		4	2	59	113	11	2	3	34	230

FINLAND

Reported Cases of Certain Diseases—September 1950

Disease	Cases	Disease	Cases
Diphtheria	72	Scarlet fever	821
Dysentery	6	Typhoid fever	16
Malaria	1	Venereal diseases:	
Meningitis, meningococcal	7	Gonorrhea	699
Paratyphoid fever	130	Syphilis	33
Poliomyelitis	60		

NEW ZEALAND

Reported Cases of Certain Diseases and Deaths—5 Weeks Ended Sept. 30, 1950

Disease	Cases	Deaths	Disease	Cases	Deaths
Brucellosis	4		Meningitis, meningococcal	12	
Diphtheria	8		Ophthalmia neonatorum	2	
Dysentery:			Poliomyelitis	6	
Amebic	7		Puerperal fever	3	
Bacillary	14	1	Scarlet fever	108	
Erysipelas	15		Tetanus	2	
Food poisoning	6		Tuberculosis (all forms)	223	53
Malaria	1		Typhoid fever	13	

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India. During the week ended November 11, 1950 cholera was reported in India as follows: Calcutta 53 cases, Madras 49 cases, and Nagapatinam 7 cases.

India (French). For the week ended November 4, 1950, 14 cases of cholera were reported in Karikal and 8 in Pondicherry. During the week ended October 28, 10 cases were reported in Karikal.

Smallpox

India. Smallpox was reported in ports of India as follows: For week ended November 11, 1950, Calcutta 90 cases, Madras 29 cases, Bombay 3 cases; for week ended November 4, Nagpur 4 cases.

India (French). Pondicherry reported cases of smallpox as follows: Week ended November 4, 1950, 32, October 28, 18, and October 21, 34.

Iran. During the week ended November 4, 1950, smallpox was reported in Iran as follows: Hamadan 1 case, Ispahan 5 cases, Kermanchah 3 cases, Sanindedj 2 cases, Teheran 1 case.

Typhus fever

Gold Coast. A case of typhus fever was reported in Accra for the week ended September 23, 1950.

Iran. During the week ended November 4, 1950, one case of typhus fever was reported in Tabriz. For the weeks ended September 1 and 8, 1950, 3 and 6 cases, respectively, were reported in Departments of Iran.

Iraq. One fatal case of typhus fever was reported in Bagdad during the week ended November 11, 1950.

Yellow fever

Gold Coast. One suspected case of yellow fever was reported in Akwatia on November 5, 1950, and on November 9 a suspected fatal case in a 4-year-old African male was reported in Taquah Aboso.

Examination for Bacteriologists

Examinations for scientists and sanitarians (bacteriologists) in the Regular Corps of the Public Health Service will be held February 12–14, 1951, in various cities throughout the country. Completed applications must be in the Washington office by January 15.

Appointments are permanent and provide opportunities for career service in research and public health activities. Benefits include periodic pay raises and promotions; liberal retirement provision; medical care; annual and sick leave.

Appointments will be made in the grade of assistant and senior assistant, equivalent to Navy ranks of lieutenant, j. g., and lieutenant, respectively. Entrance pay is $4,486 for assistant (with dependents) and $5,346 for senior assistant, including rental and subsistence allowance.

Candidates must have at least 7 years of professional training and experience beyond high school, and must have, or expect to receive by November 1951, a master's or doctor's degree in bacteriology.

For application forms and additional information, write to: Surgeon General, United States Public Health Service, Federal Security Agency, Washington 25, D. C. Attention: Division of Commissioned Officers.

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The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

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Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

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Public Health Reports

VOLUME 65 **DECEMBER 15, 1950** NUMBER 50

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FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
G. St. J. Perrott, Chief of Division

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Public Health Reports

Vol. 65 • DECEMBER 15, 1950 • *No. 50*

Public Health: 1950

This is the second issue of Public Health Reports presenting the scientific highlights of the 78th Annual Meeting of the American Public Health Association in St. Louis, Mo., October 30 to November 3, 1950. The courtesy and cooperation of Dr. Reginald M. Atwater, Executive Secretary of the Association, has made this reporting service possible.

Our sources, aims, and editorial policies were outlined in the December 8 issue and apply with equal force to the material following. We have not abstracted nor summarized the papers presented. Neither have we given a chronological accounting or editorial evaluation of the meeting. This is a news-type reporting of the highlights of many of the sessions . . . a panorama of "Public Health: 1950."

Topics covered here are chronic disease, child health, epidemiology, and medical care. The first part of the report covered defense and world health, public health practice, and environmental health.

We would like to repeat what we said last week: "The material is put forth on a more or less experimental basis both as to content and presentation. We hope our readers will give us the benefit of their comments and suggestions."

This report was prepared under the direction of Howard Ennes, M.P.H., Office of the Surgeon General, Public Health Service. Appreciation is expressed to the more than 20 members of the Public Health Service staff who aided in the collection and summarization of the material, and to the editorial staff of PUBLIC HEALTH REPORTS who participated in the summarizations in addition to editing the material for publication.

Chronic Disease

MULTIPLE SCREENING

Bright Future Via Experimental Approach

The concept of multiple screening is basically sound and fits in admirably with the current trend in public health toward a unity and greater integration of programs, Leonard A. Scheele, M.D., Surgeon General of PHS, said in giving a general orientation and background to a discussion of current experiences in multiphasic health examinations before the final APHA special session

Multiple screening offers a type of activity in which specific disease control programs can be welded into an integrated approach to the solution of health problems, Dr. Scheele said. He noted that this approach has emerged as an experimental procedure from several well-known public health practices, including mass laboratory testing in epidemic control, industrial and school medical inspections, and the modern concept of mass case finding. Thus, the use of diagnostic techniques has shifted from a rearguard action against epidemics to an offensive against certain chronic diseases.

The Surgeon General reviewed some of the many medical and public health professional issues which revolve around this new approach,* emphasizing that "the concept of multiple screening has a brilliant future, but the only valid approach at the present time is experimental." As an example of questions which remain unanswered and which require much future investigation, he cited problems centering on the ability of current private and public resources for medical care to handle the large numbers of persons referred to them for diagnosis and treatment in the wake of mass multiple screening.

Goal is Raising Level of Preventive Medicine

There is continuing need, he said, for basic and applied studies leading to additional and more effective diagnostic tests adaptable to mass application. There is need for research in methods of organization, administration, technical operations, and statistical control. There is need for studies of the socioeconomic effects of multiple screening programs, and for carefully planned and thoroughly applied techniques of appraisal and evaluation.

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*Dr. Scheele made special mention of the paper by Dr. Joseph W. Mountin in Public Health Reports, Oct. 20, 1950, pp. 1359–1368.

If the multiphasic health examination or the multiple screening campaign is to be woven into the fabric of public health, the Surgeon General felt, it must be directed toward the basic goal of raising the level of preventive medicine in the community. A multiphasic program can be a powerful force for integrating preventive and curative medical services; or it can be an equally potent divisive force, weakening both essential types of service by its effects on public opinion and attitudes. If the program does not satisfy basic needs and desires of the people, the people will lose faith in their public health services or their private medical services, or both.

Dr. Scheele stressed that it is therefore essential that all responsible persons think through a proposed multiphasic program to its logical, long-range conclusions. He said that the focus of thought must be on the patient—the human being, sick or well, in his total environment. The prime consideration is for the physical, mental, and social problems of each individual who presents himself voluntarily to his health department as a "guinea-pig" in this new way of "processing" his blood, heart, lungs, eyes, ears, and so on.

Alabama, Indianapolis, New Orleans

The special session heard reports of six current experiences from persons directly concerned with their planning and direction. W. H. Y. Smith, M.D., Director of the Bureau of Preventable Diseases, Alabama State Department of Health, reported on the State-wide program developed in association with statutory requirements for venereal disease screening. A somewhat different type of continuing program was described by Gerald F. Kempf, M.D., Director of the Indianapolis Department of Health. This program is being operated at Flanner Settlement House in Indianapolis and is yielding valuable statistical data based upon comprehensive follow-up of the screened cases showing positive results.

From New Orleans came a report of another continuing program, this from the School of Medicine at Tulane University. William A. Sodeman, M.D., Professor and Chairman of the Department of Tropical Medicine and Public Health, said their experience indicated that screening procedures must include history and physical examination in order to be effective for degenerative vascular and malignant diseases. Screening by the usual laboratory bracket and chest plate was extremely important in disease detection but left a "blind spot" with reference to important and killing diseases. Other evidence concerning the relative value of the history and physical examination—particularly in terms of time, cost, and returns—was presented by Vlado A. Getting, M.D., Commissioner of the Massachusetts State Department of Public Health.

The Richmond Program

The most complete screening ever attempted in a single program marked last summer's multiple screening project in Richmond, Va., Edward M. Holmes, Jr., M.D., and Paul W. Bowden, M.D., Director and Assistant Director of the City Health Department, reported. The cooperative program, supported by a large number of local groups and PHS, offered tests for: height and weight for obesity, chest X-ray for tuberculosis and heart abnormalities, blood pressure for hypertension, a blood test for syphilis, a hemoglobin reading for anemia, visual acuity for intraocular tension, a urine analysis for diabetes, and, for every tenth person, an electro-cardiogram.

Dr. Bowden, summarizing Richmond's experiences for the Laboratory Section, advised: "First, do not try to carry too great a load at the expense of the normal routine work without adequate help, both in trained reserve personnel and in enough nontechnical support to allow full use of your technical knowledge; second, be sure to have adequate service personnel to take care of washing, sterilizing, and preparation of supplies to the clinic; and third, do not allow the clinic to take more specimens than the laboratory can handle . . ."

The Atlanta Project

The Atlanta project, which terminated last June 30, was the largest multiple screening test ever undertaken, reported C. Dan Bowdoin, M.D., Director of the Division of Venereal Disease Control, Georgia State Department of Public Health. More than 236,000 individuals of the greater Atlanta area were tested for seven conditions. Fourteen testing stations were operated in the area in department stores, schools, churches, hotels, and industrial plants. Mobile units were also included. Tests included a blood test for syphilis, diabetes, and hemoglobin; chest X-ray for tuberculosis and other chest pathology and possible abnormalities of the heart; height and weight; and dental examination.

Commenting on the Atlanta program before the Dental Health Section, Ernest B. Mingledorff, D.D.S., Assistant Chief of the Division of Dental Health, Georgia State Department of Health, said that a total of 213,019 persons volunteered for examinations of the mouth, head, face, and neck. These examinations were performed by 18 graduate dentists. Out of 708 persons who returned for a recheck, 442 were referred to their personal dentists for conditions which were marked "neoplastic and/or precancerous."

A summary panel discussion at the special session brought out that in all programs persons participated voluntarily, and those found to require diagnostic services were referred to their own physicians or other sources approved by the medical profession. Variations in purpose, organization, operational methods, type of public appeal, number and types of techniques employed, number of persons examined, and average time required for screening were cited as underscoring the developmental nature of the concept at present. Those participating on the panel were: Lester Breslow, M.D., Chief of the Chronic Disease Service, California State Department of Public Health; A. L. Chapman, M.D., Chief of the Division of Chronic Disease, PHS; and Edwin F. Daily, M.D., Director of Division of Health Services, Children's Bureau. C.-E. A. Winslow, Dr.P.H., Editor of the American Journal of Public Health, presided. Sponsored by PHS, a demonstration of multiple screening, in which over 500 persons were tested, featured the scientific exhibits program of APHA.

AGING AND PUBLIC HEALTH

Bring Attitudes in Line With Science

As surely as the human body changes with age, so does the social life of a person change—and age, Clark Tibbitts, Director of the recent Conference on Aging,* told the Sections of Epidemiology, Health Officers, Medical Care, and Statistics.

The aging process falls into two categories: biological and social. Society defines one role—and we adjust to it—nature moves in her own inimitable way. But between the two are many and devious relationships. Man cannot resist nature, as yet, but aging man today is resisting the role society offers—utter oblivion. The challenge to public health is to assist in bringing social attitudes toward aging into line with newer concepts of science, Mr. Tibbitts said.

The problems of the aging group are aggravated today by several factors. There are fewer offspring, hence fewer workers to support the aging population. A speeded-up industry desires only young workers (13 years of possible idleness faces the 65-year-old retired worker). Urbanization has made it difficult, if not impossible, for more than two generations to be housed together conveniently. The lack of facilities for the aging in health services and in social services are glaringly apparent. All of these and more are problems which must be solved before society can say that the job of caring for the aging is being accomplished with any degree of efficiency.

This is the situation the aging face, Mr. Tibbitts said.

What then are the effects upon society, he asked, pointing to the recent Conference on Aging sponsored by the Federal Security Agency and the interest shown by over 800 delegates as important evidence that the Nation is becoming aware of the problems facing our older citizens. Not only were health and welfare workers aware of the difficulties in their field, but labor, industry, education, and insurance officials voiced the coming needs which must be met.

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*See Mr. Tibbitts' report on the conference in PUBLIC HEALTH REPORTS, Oct. 20, 1950, pp. 1369–1374.

Economic Troubles Ahead

The growing number of old people can become financial dependents. In 1948, about 3½ million out of 11 million persons 65 years of age and over had no personal monetary income. Of the 7½ million with an income, one-third had less than $500 annually. Pensions and government subsidies alone cannot solve the problem. Employment of the older people must become a major factor in the alleviation of this condition. Today they are needed in defense; tomorrow they must continue to be needed tor peace, Mr. Tibbitts asserted.

First, their employability and their functional residuals and capacities must be known. The factors which may postpone death in the aged body may also prolong the period of high vitality, and, hence, employability. Research in this field must be interdisciplinary. Biological and medical workers must be concerned with physiological functioning and capacities, psychologists with motivation and trainability, personnel workers with job requirements. The retirement policy of the future must be based upon biological age instead of upon years, and all workers need pre-retirement training. Abrupt retirement may be a death sentence to some. Gradual retirement may be an alleviating practice, he suggested.

Living, Not Just Existence

The well-being of any individual depends upon his ability to decently satisfy his total needs. The basic needs do not change with passing years, but the means of satisfying them do. Deterioration and early death may follow if the aged person cannot satisfy his needs. He must attain good adjustment through avocational and recreational channels as well as through employment. It must be possible for him to live independently, not in an institutionalized herd. He needs companionship and emotional security. Privacy is as necessary in the older years as it is in younger years, Mr. Tibbitts felt.

Many aged couples need their own homes and these homes should be constructed for the aged—not for youthful limbs and eyes. There should be medical services available, also housekeeping assistance when necessary. Many old couples find the later years together a pleasure and a comfort. Foster homes are needed for those single persons who still desire a semblance of family life. None of these can be available until the community realizes its responsibility; until geriatric clinics, health counseling, hospital facilities, and convalescent care are available. America is appallingly undersupplied today. Even though it may still be too early for many communities to undertake action programs, they can begin to survey the living arrangement and the needs of the older persons in their midst, he said.

"The questions raised certainly are in the socioeconomic sphere. Whether they fall within the widening sphere of public health," said Mr. Tibbitts, "is a matter of the concept of each of us; certainly they do impinge."

REHABILITATION

Living To Hilt of Capabilities

Today, as medical science moves forward in the prevention and cure of infectious disease, chronic illness and crippling have become the Nation's primary medical problem. Such was the key of the clinical demonstration on rehabilitation and public health presented before the Medical Care Section by Howard A. Rusk, M.D., Chairman of the Health Resources Advisory Committee of NSRB, and D. Elliott O'Reilly, M.D., Chief of Physical Medicine and Rehabilitation of the St. Louis University School of Medicine.

They pointed out that one of the principal causes of the increase in crippling has been the great advances in medical and surgical care which have prevented death and produced an aging population. Two thousand years ago, the average length of life was 25. At the turn of the century, it was 49. Today, it is 67.2. What, they asked, are the medical and public health implications of this increasing age level of the population?

First, as people become older, their medical needs change, and they demand more medical service. Today, we are busily studying and discussing the needs and the best plans for increasing and distributing medical services, yet the growing age level of the population indicates that by 1980—when it is expected that the number of persons over 45 will constitute nearly half of the population—we may need nearly double the amount of medical service that is available today.

Second, lacking specific measures in the cure of many of the chronic diseases, medicine must look to rehabilitation to teach those afflicted by chronic disability to live and to work as effectively as possible with what they have. Until medicine finds specific answers to the problems of the diseases of the heart and circulation, rheumatic fever and arthritis, cerebral palsy, multiple sclerosis, poliomyelitis, and the other crippling diseases, we must utilize the techniques of physical rehabilitation, psychology, social service, and the other allied ancillary specialties of rehabilitation to teach the disabled to live within the limits of their disabilities but to the hilt of their capabilities.

The clinic demonstration included presentation of methods of rehabilitation with patients suffering from hemiplegia, paraplegia, arthritis, and residual physical disabilities from poliomyelitis. It was emphasized that the selectively placed rehabilitated person can do the job better than the unhandicapped. In fact, only 1 percent of persons can do any job, and only 1 percent can do no job at all.

Rehabilitation calls for medical and surgical restorative services, training in use of appliances and equipment, and selective placement. All general hospitals should have rehabilitation units, and local health officers have primary responsibility to stimulate rehabilitation work in their communities, Drs. Rusk and O'Reilly felt.

CANCER

Control Programs Use New Tools

Eleven reports on the dramatic growth of cancer control programs in the United States and other countries were made at the seventh annual scientific session of the Public Health Cancer Association. An across-the-border flavor was added as Ralph Warwick, M.D., Executive Director of the National Cancer Institute of Canada, and Austin V. Deibert, M.D., Chief of the Cancer Control Branch of the National Cancer Institute, PHS, reported on parallel developments in official cancer control programs.

Pointing out that cancer control has no established case-finding device that can be applied on a mass basis, Dr. Deibert called the program one of inquiry, of applying new or recognized procedures for trial or demonstration purposes as well as for disease control. Among new tools listed were a series of diagnostic motion pictures for physicians, a film to teach women breast self-examination, programs to investigate environmental cancer and cancer diagnostic tests, and programs for improving cancer instruction of mental, dental, and pharmacy students.

The Director of the Danish Cancer Registry, Johannes Clemmesen, M.D., now a special fellow at the National Cancer Institute, reported that analysis of registry cases in Copenhagen demonstrated a close parallelism between social status and incidence of cervical cancer. He felt this was possibly explainable by a difference in the number of pregnancies, and that lung cancer and breast cancer are probably influenced by social status.

Lung Cancer and Smoking

An intensive follow-up of suspected cancer cases in Boston, made in conjunction with a tuberculosis X-ray survey, turned up enough previously unknown cancer cases to justify looking for lung cancer in tuberculosis studies, according to a preliminary report by Clarence L. Scamman, M.D., of the American Cancer Society. Of more than one-half million persons X-rayed with small film, over 9,000 were sufficiently suspect for large-film study; 76 cancer cases were found in this group. Tobacco smoking was implicated in lung cancer, said Lester Breslow, M D., Chief of the Chronic Disease Service of the California Department of Public Health, whose preliminary data were consistent with earlier studies by other groups. The discussant, Dr. Evarts Graham of Washington University, strongly supported this view.

Insufficient sensitivity and specificity to justify use of the Iodoacetate Index as a practical tool for cancer case finding was reported by G. J. Dammin, M.D., Associate Professor of Pathology at Washington University School of Medicine, at a joint session of the APHA Laboratory Section and Public Health Cancer Association. The cytologic test, developed by Papanicolaou and others, has proved to be of value in early diagnosis of lung cancer as well as other sites, according to Peter A. Herbut, M.D., Professor of Pathology at Jefferson Medical College. Methods of evaluating chemotherapeutic agents in cancer were reviewed by C. Chester Stock, Ph.D., Chief of the Division of Experimental Chemotherapy of the Sloan-Kettering Institute for Cancer Research.

MORBIDITY ANALYSIS

Dynamics of Illness Can Be Studied

A critical review of methods of measuring incidence and prevalence, particularly in chronic disease, was given before the Epidemiology, Health Officers, Medical Care, and Statistics Sections by Harold F. Dorn, Ph.D., Chief of the Biometrics Branch, National Institutes of Health, PHS.

He set forth five principles by which methods of studying the natural history of disease may be evaluated: (1) The size and composition of the base population must be known; (2) generalization of findings beyond the specific population studies should be possible; (3) the study should extend over a period of time; (4) as much as possible of the entire scale of ill health should be included; (5) it should be possible to obtain detailed verifiable information about illness.

Dr. Dorn examined, from these standpoints, universal reporting, records from health, medical or insurance programs, population surveys, longitudinal studies, and diagnostic surveys. He concluded that no single method is satisfactory by itself. He pointed out, however, that the population survey, especially if combined with some form of diagnostic screening and verification of diagnosis, can be expected to yield reliable incidence rates for all forms of illness and prevalence rates for specific diseases. It will also produce data for studying the relationship of these to different demographic and environmental factors.

Population surveys are not very efficient for measuring the incidence of specific diseases, Dr. Dorn said, especially those which do not have abrupt onset and persist for long periods. Consequently, the population survey should be supplemented with intensive studies of illness in complete population groups. Longitudinal studies offer real promise, he felt, and "only in this way can the dynamics of illness be understood."

HEART DISEASE

Long-Term Studies at Framingham

Description of a long-term epidemiological study of heart disease based on a population of normal composition, including both the sick and the well as they are found in a community, was given before the Epidemiology, Health Officers, Medical Care, and Statistics Sections by Thomas R. Dawber, M.D., Gilcin F. Meadors, M.D., M.P.H., and Felix E. Moore, Jr., of PHS.

They pointed out that almost nothing is known of the epidemiology of hypertensive or arteriosclerotic cardiovascular disease, although these two account for the great bulk of deaths from cardiovascular disease. The Framingham study was reported as an approach to the problem.

This project, set up in 1947, is carried on by the National Heart Institute of PHS in cooperation with the Massachusetts State Department of Public Health and the Town of Framingham. The plans for the project were given the endorsement of the Massachusetts State Medical Society. A sample of 6,000 residents of Framingham between the ages of 30 and 59 are being given a cardiovascular examination in a special clinic. Those found free of arteriosclerotic or hypertensive cardiovascular disease will be given biennial follow-up examinations over an extended period in order to determine the point of onset of these diseases in previously normal individuals. All medical planning for the study was done in consultation with a technical advisory committee made up of 11 physicians from the Boston area who are expert in the fields of cardiology and public health.

Retrospective analysis of the data will permit the isolation of factors associated with the development (or nondevelopment) of these forms of cardiovascular disease. Data will also become available on the efficiency of various diagnostic procedures in detecting heart disease or in predicting its future development. An important byproduct will be data on prevalence and incidence of cardiovascular disease in a carefully examined population of normal composition.

The work of building a community organization began months before the start of clinic operation, Dr. Dawber reported. From this study grew plans for the appointment, by the town health officer, of a 15-person executive committee for the study—a committee which was broadly representative of the various groups in the community. Parallel to, and integrated with, the lay executive committee, a professional committee of physicians and dentists was organized under the chairmanship of a cardiologist. Together, the executive committee and the professional committee accepted the responsibility to assist in planning a program which would be acceptable to the community as a whole; to interpret the aims and objectives of the study in a way which would be understandable to all elements of the community; and to bring recognized and potential leaders of the community into active participation in the organizational aspects of the study.

The service aspects of the study are limited to diagnostic information which is furnished only to the personal physician of the person examined. Where there are abnormal findings, the individual is referred to his own physician for interpretation of the findings and treatment if necessary. The clinic staff does not provide treatment nor offer advice on treatment.

FOOD ACCEPTANCE

Appetite Levels, Productive Longevity

"Appetite level" records may reveal one of the most objective methods of diagnosing the nutritional corrective for chronic disease since the relationship is doubtless complex and multiple, it was suggested to the Food and Nutrition Section by W. Franklin Dove, Ph.D., Director of Food Acceptance Studies at the University of Illinois College of Medicine.

He noted that the continual acceptance and rejection of foods by each individual from day to day, year to year, from birth to old age, gradually makes a strong impression upon the mind as well as upon the function, form, and status of the body. These mental impressions and bodily effects come to be expressed through likes and dislikes, preferences and prejudices. They are strongly associated with the subsequent rate of food consumption and the amount of nutrients consumed. Eventually they determine, at least in part, the physiological success of the individual. It may be possible to measure this characteristic of appetite levels and to relate it, through the foods accepted, to productive longevity.

In the surveys on human appetite levels, the ability of the subjects to continue active duties of their occupation, regardless of age, can be used as the measure of biological success. A measure of productive longevity for contrast with measures of nutritional deficiencies and chronic diseases may not need any further refinement as a measure of success than the ability to work day after day, assuming that opportunity is given to work and retirement not enforced at the young age of 65.

CITY PROGRAM

Community-Wide Planning Basic Need

"We are thoroughly convinced that the most effective approach to the control of chronic diseases lies in community-wide planning. The official agency cannot perform or accomplish the whole program. It cannot successfully initiate or undertake all the studies that are needed. It cannot by itself gain the needed community support. At best, it can stimulate the community by focusing attention on the problem. To achieve community support, the health officer must work in complete cooperation with the health-related agencies of his community."

Thus concluded Edward M. Holmes, Jr., M.D., M.P.H., and Paul W. Bowden, M.D., M.P.H., Director and Assistant Director of the Department of Public Health, Richmond, Va., in reporting to the Epidemiology, Health Officers, Medical Care, and Statistics Sections on development of chronic disease activities and the role of the health department. They reported on the work of a community-wide committee on chronic diseases and cooperative activities representing an annual per capita expenditure of \$8.02 of which \$5.27 is budgeted by the health department and only 4 percent represents State and Federal funds.

Breaking with Public Health Traditions

Describing the background of the project, they recalled that the staff of the health department soon realized that the chronic disease problem was complex, and that part of the imbalance in the department's over-all program was due to the increased emphasis being given to these diseases. The staff was also aware that the organization of a community-wide program for the control of these conditions would necessitate the breaking of many public health traditions. Such a program would call for the greater emphasis on the curative aspects of medicine, on rehabilitation, and, lastly, it would definitely require the department to assume greater responsibility in the field of medical care, Drs. Holmes and Bowden noted.

In 1947, they said, the Richmond Area Community Council was asked for advice and assistance. After preliminary studies and planning, the chronic disease committee and a committee on geriatrics was set up. Special aspects of the over-all problem were examined by subcommittees and the general committee, and actions recommended.

New Home Care Program

One topic explored was the home care service which, Drs. Holmes and Bowden said, was "no better or worse than the home care provided under the usual 'city poor' physician type of program." After careful study, it was recommended in 1948 that the city abandon the services of its six part-time physicians, that it establish within the Medical College of Virginia three residencies in general practice, that a general practice clinic be established within the Medical College of Virginia, and that the hospitalization and out-patient clinic program for the indigent be coordinated with the home care service.

This proposed program was endorsed by local medical authorities and was put into effect in 1949. The home care program is now providing a service of high quality which guarantees continuity between the home, the clinic, the hospital, convalescent facilities, and the rehabilitation center, they said.

Nursing Merger and Medical Care Facilities

On the basis of a 2-year demonstration in South Richmond, tentative plans are being laid for a city-wide merger of the nursing service of the health department and the Instructive Visiting Nurse Association, it was reported. This merger would be effected by contract renewable on an annual basis and provides that the Nurse Association retain its integrity. Bedside nursing service is also under study.

In 1947–48, a subcommittee made a detailed study of the existing facilities available for the care of chronic illnesses. This study included consideration of bed capacity, percentage of occupancy, patient days, admission policies, average stay, and monthly rates. On the basis of the report, the committee on chronic diseases recommended that a 125-bed chronic disease facility be located in a general hospital; the city home be renovated and utilized for convalescent care for the indigent and the medically indigent; a convalescent facility be made available near the tuberculosis sanitorium so planned as to permit a maximum of self-help and occupational therapy; and rehabilitation of chronically ill patients in the acute and chronic hospitals be stressed. Authorities have taken positive action.

Dental Care and Rehabilitation

Still another committee surveyed dental care facilities and emphasized a dental care program for the needy, Drs. Holmes and Bowden said. An adult care program established within the health department's medical care bureau was recommended, and $25,000 was appropriated by the city council.

Another subcommittee studied the adequacy of the community's rehabilitation facilities for 2 years. Out of this study grew specific recommendations, the publication of a directory of available facilities, and an educational campaign encouraging the employment of the handicapped.

In the midst of these and related studies, the Richmond health officers reported, it was possible for the department—on a broad, community-cooperative basis—to operate a pilot study of community-wide application of multiple screening techniques as a means of case finding and measuring the chronic disease problem.

Child Health

CHILD HEALTH CONFERENCES

Focus on Mental Health of Child

Current trends and developments in child health conferences are encouraging, but any cheerful impression that it is a universal or comprehensive movement is sobered by findings of the American Academy of Pediatrics that only 6 out of 1,000 children in the United States under 5 years of age attended a conference during the year of study, reported Samuel M. Wishik, M.D., M.P.H., Director of the Bureau of Child Health of the New York City Department of Health. He previewed material being collected by the APHA Committee on Child Health and summarized current trends for the Sections on Food and Nutrition, Maternal and Child Health, and Public Health Nursing, and the American School Health Association.

Among significant trends noted was that of taking positive steps to keep the preschool-age child under health supervision. Two factors which bear on this trend are the practice of giving booster immunizations between the first year and school attendance, and the emphasis upon the psychological aspects of feeding.

Immunization and Feeding

Separate special immunization sessions have almost disappeared. Since immunizations are now usually given at the time of a regular health supervision visit, better opportunity exists for health education. Conferences are utilizing such simple but salutary measures as having the needles and other immunization procedure kept out of sight so that other children in the waiting room are not disturbed, and giving the child truthful warning in advance of the injection.

In feeding instructions the trend is away from rigid scheduling and prescribed quantities of solid food and more upon the psychological aspects of the feeding situation. Feeding probably still rates number one in frequency among child rearing problems but seems to be lessening as a somewhat more permissive atmosphere is being created around the feeding situation. Sleeping problems are probably running a closer second to eating difficulties than was formerly the case.

The mental health or psychological aspects of child rearing are taking on increasing importance in the work of the child health conference, as in general pediatric thinking and practice today, Dr. Wishik pointed out. The primary objective expressed by the majority of child health conferences is to help parents to rear children so that the children will be healthy and the family setting will be a wholesome one. Discussion on feeding, sleeping, habits, discipline, and behavior take a prominent place in the work of the child health conference. At the same time, distinction is quite clear between these activities and those of a psychiatric service such as a child guidance clinic.

Anticipatory Guidance

It is to those who have not yet experienced difficulty, to whom child health conferences are trying to give greatest attention. The terms "anticipatory guidance" or "anticipatory counseling" are being used to describe the practice of forewarning mothers of the critical points in child rearing at which troubles commonly begin. For example, Dr. Wishik said, when a mother happily reports that her 10-month infant eats a large bowl of cereal, she is told that when the baby will be about 15 months old, he may actually eat less food than now. He will be bigger, but he will be growing less rapidly and need less food. Many feeding difficulties begin because of the mother's concern at the unexpected drop in intake. Here is the best kind of preventive mental hygiene at a simple physiological level, he said.

With the increasing emphasis on the mental health aspects of child rearing, the traditional instructional type of interview between the mother and the doctor or the mother and the nurse becomes less appropriate. The two-way discussion in which the professional person does at least as much listening as talking is now beginning to appear. Since the interview has not been a prominent part of the professional training of the physician or the nurse, new techniques in the medical and nursing interview must be developed. For example, the classical rigid sequence of history taking, physical examination, immunization, or other procedure must be modified and fitted into the total interview situation.

Group Teaching Techniques

Dr. Wishik noted that for a good many years, sporadic efforts have been made to supplement the individual interview with group teaching. Studies are now under way, he reported, on the most effective composition of groups of mothers and the methods of introducing group techniques into the child health conference. The scope of the group work is intended to be no broader than the usual content of the conference and the group sessions are to be carried by the regular conference staff.

Two general points stand out from the current survey, Dr. Wishik felt. First, it is quite clear that no immediate substitute for child health conferences exists in many parts of the country and that for the present such services need expansion and strengthening. Second, it is apparent that immediate consideration could be given to making available to the private physician the public health nursing group instruction of mothers, printed literature, and other advantageous features of the child health conference.

FOOD AND NUTRITION

Children Must Learn Good Food Habits

The problem of really improving the nutritional status of children is a problem of improving their food habits, and children must be educated to eat the foods presented, Martha E. Hollinger, Associate Nutritionist at the Agricultural Experiment Station, Louisiana State University, told APHA nutritionists.

Introducing more protective foods into the diet through the school lunch program is largely an educational problem, she said, noting that the school lunch room is no longer a mere low-cost filling station but an integral part of the school health program. To improve food habits of school children, nutrition education must begin with principals and teachers. Too few of these understand the importance of protective foods in their own diets and the even greater importance of these foods in the diet of the growing child.

Teacher education, Miss Hollinger felt, has been extremely short on the simple basic nutrition information needed by the teachers to select an adequate diet for themselves or to help children. There is a crying need for integration of simple basic nutrition information into programs in teacher training institutions and in public schools. But such instruction must deal with more than facts, for knowledge about nutrition does not of itself guarantee the practice of good habits of eating. Nutrition instruction must develop a desire to make these facts function in the daily life of individuals.

Controllability of Human Growth

There is evidence that growth can be controlled within limits through environmental factors, Julian D. Boyd, M.D., Professor of Pediatrics at Iowa State University College of Medicine, said at a panel discussion on child growth and development at a joint session of the Food and Nutrition, Maternal and Child Health, and School Health Sections of APHA, and the American School Health Association.

The rate of growth is subject to decelerating factors, and faulty nutrition is probably the most important direct cause. Many accessory factors may favor faulty nutrition, including chronic physical or emotional fatigue, recurrent infections, emotional disturbances, and sometimes metabolic derangements. Insistence on performance which exceeds the child's ready capacities in either the physical or the emotional sphere may lead to the establishment of a vicious cycle. Smallness of stature and underweight frequently are the forerunners of more obvious and more severe disturbances of health.

While admitting that genetics plays a determining role in the establishment of the upper limits of growth and development, Dr. Boyd felt it was important to recognize that faulty environmental agencies often suppress the native rate of growth and ultimate physique. Appraisal of physical growth should be a part of each examination of the infant or child, whether or not disease is suspected. Substandard response, either for body length or for weight, should lead to meticulous investigation of the child's pattern of living, with the assumption that such pattern is at fault until it is proved otherwise.

SCHOOL HEALTH

Medical Society Participation High

Research trends and development were reviewed, and four specific projects reported to the School Health Section. Fred V. Hein, Ph.D., and Donald A. Dukelow, M.D., of the Bureau of Health Education of the American Medical Association, said that more than 1,000 local medical societies provided data for a questionnaire study of physician and medical society participation in school health services.

They reported a high level of interest and participation by physicians and medical societies in many aspects of school health services, and pointed to some areas in need of strengthening. One-third of the medical societies replying have a school health committee. One-quarter of the communities have school health councils, nine-tenths of which include medical society representation. School physicians, chiefly part time, are reported by slightly more than half of the medical societies. There is little difference in the proportion of school children examined by family physicians and school physicians.

Established methods of referring children to a physician through their families are reported for 80 percent of the communities. Channels by which the family physician can inform the school of a child's special health needs were cited for 64 percent. Two-thirds have modified physical education to meet special needs of pupils, and a quarter provide corrective exercise on medical prescription. Basic health services for athletes are reported by four out of five. First-aid facilities are present in over three-fourths, but only a third have complete plans for emergency care. Exclusion and readmission for communicable disease are acceptable to school and health officials in 87 percent. Only half report pre-employment and periodic health appraisal of school personnel.

12,000 Physicians for Inspections?

In many communities in the United States an annual examination of every school child is utilized to find children in need of medical attention. If this were done throughout the United States the services of 12,000 physicians for half a day every day in the school year would be required solely to examine every elementary-school child, commented Alfred Yankauer, Jr., M.D., Director of Maternal and Child Health Services for the Rochester Bureau of Health.

Since it is unrealistic to think of meeting such requirements, it becomes important to develop screening techniques which will utilize professional personnel to their best advantage yet not overlook any child who needs attention. Dr. Yankauer said that the Astoria plan of school medical service developed in New York City in 1940 utilizes the teacher to refer selected children to the school nurse and physician.

Experiences with a rheumatic fever institute, national in scope and designed to review the public health aspects of rheumatic fever and other pediatric cardiac problems and to demonstrate the interrelationships of the disciplines rather than to emphasize the clinical aspects, were reported by Ruth Whittemore, M.D., of the Connecticut State Department of Health and Associate Clinical Professor of Pediatrics at Yale University. The impetus for this institute, held at New Haven, came from the Children's Bureau, and findings are being utilized in planning further projects.

From St. Louis came a report of a vision testing project designed to develop a screening test which could be administered by nontechnical personnel to large groups of children. The eyes of 1,216 pupils in the first and sixth grades of 14 public schools were examined by several tests, and about 26 percent were found in need of correction. This project was jointly sponsored by the Children's Bureau, the National Society for the Prevention of Blindness, and the Missouri Division of Health with the cooperation of the St. Louis Board of Education and the Washington University School of Medicine.

PREMATURE INFANTS

Standardization of Reporting Essential

Rapid strides are being made in the prevention of premature birth and the care of premature infants, and important responsibilities in the measurement of needs, planning of programs, and evaluation fall to official health agencies, the Maternal and Child Health Section heard.

Basic data needs and the importance of standardization of reporting and analysis—a move materially aided by the 1949 revision of the standard birth certificate—were discussed by Elizabeth Parkhurst of the Office of Vital Statistics, and Edward R. Schlesinger, M.D., Director, Bureau of Maternal and Child Health, New York State Department of Health. The mortality rate among premature infants has been declining in New York since 1945, they reported, the overall reduction being 14 percent.

Based on New York experience, they felt that it was the responsibility of State health departments to compute and make such data available. They are in a better position than local departments to correlate the information and insure uniformity of classification and tabulations. Also, few hospitals, even the largest, have facilities for the statistical analysis of their cases.

Uniform Hospital Data

Problems of standardization of hospital statistics were outlined by Samuel M. Wishik, M.D., Director of the Bureau of Child Health, New York City Department of Health. He and his associates (Helen M. Wallace, M.D., Rowland Mindlin, M.D., and Arthur Lenz) reported that there are approximately 150,000 live births recorded each year, and about 8 percent are premature. Although infant mortality is 2.5 percent, among premature infants it is approximately 17 percent. They felt that a uniform method of keeping statistics on premature infants was obviously necessary to evaluate the care afforded in premature centers.

Dr. Wishik's group reported on a sampling analysis of the reporting problem and on the method developed to overcome inaccuracies. An effective system, they said, should make it possible to evaluate not only the pediatric and nursing care of the premature infant but also to evaluate to some extent the quality of antepartum and intrapartum care, since a premature birth and a death in a premature infant, in a sense, may be interpreted as a deficiency in obstetrics in some instances. "The role of the obstetrician," Dr. Wishik noted, "is a difficult one in which to stimulate community and professional interests."

Qualitative Evaluation

From Philadelphia came a report of a community study of neonatal mortality. Elizabeth Kirk Rose, M.D., Chief of the Division of Child Hygiene in the city health department, told of the committee representing the five medical schools, the Philadelphia County Medical

Society, the Philadelphia Pediatric Society, and the health department. The groups meet several times a year to review reports of neonatal deaths from the point of view of the cause of death, the rating of responsibility as to whether obstetric or pediatric, preventable or not, and the possible factors.

The rating of responsibility is never judged lightly, Dr. Rose said. It may be tentatively rated and the case referred back to the hospital representative to ascertain the staff's opinion if not already clearly stated. If the case seems of sufficient interest or importance, it may be selected for discussion at an open meeting. Three weeks before a meeting the representative is notified. He reviews the hospital record, notifies all interested staff members, and presents the case. Then there are questions and discussion, and a vote is taken both as to the cause of death and the rating of responsibility. It is the atmosphere of these meetings and the tone of the whole program of activity that is the keystone of any success this study may have had. The realization that others have problems, too—that others make mistakes but have learned to discuss them objectively in an honest endeavor to find out how to reduce their frequency, to learn of new application of scientific advances—this is the inspiration and satisfaction that are basic to any cooperative educational effort, Dr. Rose emphasized.

Data regarding infant prematurity in Tennessee have served to show the nature and size of the problem in the State, and as a result county personnel are now evaluating their own problems, Robert H. Hutcheson, M.D., Commissioner of Health, and Ruth R. Puffer, Dr.P.H., Director of the Statistical Service, State Department of Health, reported. From a study of the infant deaths reported in 1949, it was found that 45.3 percent of the infant deaths were of premature babies. The neonatal mortality rate for premature infants in 1949 was 210.1 per 1,000 live births. For full-term infants the neonatal death rate was only 10.5 per 1,000.

WATER FLUORIDATION

Caries Reduction Seen in Wisconsin

To reduce the incidence of dental decay, 32 Wisconsin cities are fluoridating their water supplies at a cost of from 2.7 to 9.5 cents per person annually, M. Starr Nichols, Ph.D., Professor of Sanitary Chemistry at the University of Wisconsin Medical School, told the Dental Health Section. He said that 27 installations in the State are adding sodium fluoride to their water, one is adding hydrofluoric acid, one hydrofluosilicic acid, and three fluosilicate.

Figuring daily water consumption for all purposes at 100 gallons per person, the total cost per person per year to maintain a fluoride concentration of 1.2 ppm with the various compounds is: sodium fluoride, 9.5 cents; sodium fluosilicate 2.7 cents; hydrofluosilicic acid, 7 5 cents; and hydrofluoric acid, 8.6 cents. The kind of fluorine compound fed into the water supply is determined by the arrangement of the equipment and the size of the installation. Because water works operators can be hurt by hydrofluoric acid, Dr. Nichols believes that it should not be recommended for fluoridation. All cities using fluoridation analyze their treated water several times a day so that the actual amount of fluoride is checked against the amount fed. This testing equipment is easily used, he said, and the results are so accurate that it is not difficult to operate within the safe limits of 0.1 or 0.2 ppm.

Only one city in the State has been operating long enough to show the effects of controlled fluoridation on tooth decay. In this city, Sheboygan, Dr. A. H. Fink, local dentist, and Dr. F. A. Bull, State Director of Dental Health, found that in 1945 before fluoridation, 20.4 percent of the 5-year-olds examined were without caries. After fluoridation, September 1946, 26.9 percent of the 5-year-olds were without caries; in September 1947, the percentage was 28.2; in September 1948, 32.4; in 1949, 37.3; and in September 1950, it was up to 43.1. In 1949 tooth decay rates for children in the fourth grade fell 24 percent; for youngsters in the 7th and 8th grades, 18 percent.

NEW ZEALAND

Dental Correction Rate High

In New Zealand, as in America, it is the rare child of 12 to 14 years of age who has a perfect set of teeth, John T. Fulton, D.D.S., Dental Services Adviser to the Child Development Research Branch of the Children's Bureau, reported to the Dental Health Section.

As a World Health Organization Fellow, he made first-hand observation of the extent of dental caries in some 1,400 children in New Zealand. Comparing his findings with published data for seven comparable areas in the United States, he found that the number of permanent teeth attacked by caries ranged from 4.7 to 9.3 per child. New Zealand was third highest, with a rate of 8.6 per child.

In New Zealand he found that 86 percent of the attacked teeth were filled. In contrast, in each of the seven United States areas the proportion of filled teeth was low, varying from one-fourth to one-half. Conversely, the percentage of tooth loss was lowest in New Zealand, the nearest American group being almost twice as high and another almost five times higher.

Epidemiology

LABORATORY INFECTIONS

1,334 Infections, 39 Deaths Reported

The first comprehensive survey to be made in this country of the incidence of infection among laboratory and research workers was reported to the Epidemiology and Laboratory Sections by S. Edward Sulkin, Ph.D., and Robert M. Pike, Ph.D., Professor and Associate Professor of Bacteriology and Immunology, Southwestern Medical School of the University of Texas.

A total of 1,334 infections presumably acquired as a result of laboratory work in the United States have been tabulated. Death resulted in 39 instances, a case fatality rate of 3.0 percent. Approximately one-third of the infections have been recorded in the literature. The remainder were discovered by means of a questionnaire mailed to nearly 5,000 laboratories. The survey was conducted under the auspices of the APHA Laboratory Section and the Division of Research Grants and Fellowships of the National Institutes of Health, PHS.

The laboratory-acquired infections include 773 bacterial, 261 viral, 200 rickettsial, 39 parasitic, and 61 due to fungi. At least 68 different agents were involved, but brucellosis, tuberculosis, tularemia, typhoid fever, and streptococcal infections accounted for 72 percent of the bacterial infections and 31 percent of all infections. The species of *Brucella* involved was stated in about 60 percent of the 223 cases of brucellosis. *B. abortus*, *B. melitensis*, and *B. suis* were about equally involved. Coccidioides outnumbers all other fungi as a cause of laboratory infection due undoubtedly to the highly infective nature of the chlamydospores. Laboratory infections with this agent are known to have occurred even in personnel who are not working directly with the fungus.

Most Infections in Scientists

Trained scientific personnel were involved in 1,005 of the infections. The remainder occurred in students, animal caretakers, janitors, and others. Research accounted for 301 cases, diagnostic work for 455, production of biologics for 25, and classwork for 29, while in the remaining cases a combination of activities was involved.

Drs. Sulkin and Pike said that the probable source of infection was indicated in all except 248 cases. The handling of clinical specimens and infected animals or ectoparasites accounted for 175 and 137 cases, respectively. Aerogenic transmission and "work with the agent" were other frequently recognized sources of laboratory infection. There were 98 infections acquired in the autopsy room. Recognized accidents, excluding autopsy accidents, were involved in 213 instances. The type of accident responsible for the largest number of infections was associated with the use of a hypodermic needle and syringe. The surveyors reported that several individuals have acquired more than one laboratory infection. Also, although numerous inapparent infections are known, these were not included in the tabulations.

Tularemia and Brucellosis Dangerous

Other reports deal with laboratory hazards attending mycotic infections, tuberculosis, virus and rickettsial diseases, and with biological safety devices.

Carl L. Larson, M.D., Director of the Rocky Mountain Laboratory of the Microbiological Institute, PHS, said that recent reports from institutions dealing with tularemia and brucellosis suggest that these two diseases are particularly dangerous to handle under laboratory conditions. He pointed out that, in general, infections resulting from handling large quantities of material are not due to breaks in bacteriological technique, but rather that the manipulation of increased volumes of infective material causes a greater amount to be released into the environment.

Certain pieces of apparatus—such as tissue blenders and shaking machines—which may be employed without any considerable danger in working with other organisms are likely to constitute a source of infection in the case of brucellosis and tularemia. Particular danger is attached to the study of tularemia in rabbits, since these animals develop pulmonary lesions and consequently release organisms into the surrounding air.

GEOMEDICAL MAPS

Atlas Links Diseases and Geography

Epidemiologists at APHA heard of a project which "has served to relight the spark of creative enterprise and reopen international scientific intercourse for the participants, and to reaffirm the nonpolitical international basis for scientific cooperation among free men."

The project was "The Atlas of Epidemiology." It was reported upon by Harry J. Alvis, M.D., M.P.H., head of the physiology faculty of the U. S. Naval Medical Research Laboratory, New London. Reviewing the background of the project, he said that during World War II German epidemiologists developed a collection of maps demonstrating the relationship between disease and geographic elements. Recognizing the scientific merits and broad utility of such information, the Navy Medical Corps has sponsored the compilation in Germany of an Atlas of Epidemiology having unity and coherence throughout, Commander Alvis said.

Geographic areas will be depicted on basic maps demonstrating altitude, routes of travel, rivers, principal cities, and pertinent background material. A series of overprintings will demonstrate the various elements in the geomedical complex. The maps depicting diseases will fall in one of three categories indicating (a) areas where the disease has been identified, (b) areas where the disease is endemic (static phase), or (c) areas over which the disease has spread (dynamic phase). A color scheme has been developed whereby all bacterial diseases will be in the same color, all virus diseases in another color, and so forth. Where animal reservoirs and vectors play a role these will be indicated by symbols.

The current phase of the project is restricted to the European landmass, Asia Minor, and North Africa. For this area 36 studies are in preparation. The broad framework of planning is so arranged that it may conveniently be integrated into the area plan of the World Health Organization. The type of information provided by such an atlas is directly applicable to the program of the WHO and Point IV of President Truman's program of aid to areas needing assistance, Commander Alvis pointed out.

POLIOMYELITIS

Nine of Ten Persons Carry Polio Antibodies

Antibodies to poliomyelitis virus are acquired naturally during the process of "growing-up," and 9 out of 10 persons over 15 years of age show signs of having antibodies to at least one kind of poliomyelitis virus in the blood, Thomas B. Turner, M.D., Professor of Bacteriology at the School of Hygiene and Public Health of Johns Hopkins University, reported to APHA epidemiologists. In a large-scale research study financed by the National Foundation for Infantile Paralysis, Dr. Turner and associates (David H. Hollander, M.D.; Pentti Kokko, M.D.; and Charles P. Winsor, Ph.D.) tested the blood of 950 persons in Baltimore. While 72 percent of the infants under 3 months of age had protective antibodies in their blood, only 10 percent from 3 months to 1 year of age had polio-resisting antibodies. This was interpreted by Dr. Turner to mean that a great many infants acquired polio antibodies at birth from their mothers, with rapid loss from the third to the twelfth month.

After 1 year of age, antibodies usually increased, reaching 50 percent of the children 4 years old. In the 5- to 9-year age group, 72 percent showed polio antibodies, as did 84 percent of the 10- to 14-year-olds, and approximately 90 percent of those above 15 years of age. The study also indicated that each year about 20 percent of the child population becomes infected with Lansing polio virus, with the vast majority of these infections of the "silent" type.

City-Dwellers Over 20 Immune

On the basis of epidemiological studies, Herman N. Bundesen, M.D., President of the Chicago Board of Health, reported that city-dwelling adults are virtually immune to all types of the virus by the time they are 20 years old. Studies carried out in association with William I. Fishbein, M.D., Frank M. Schabel, Jr., Ph.D., and Albert E. Casey, M.D., and supported by the National Foundation for Infantile Paralysis, showed that from 3 to 4 percent (100,000 to 125,000) of the population in Chicago become infected yearly, and that the ratio of reported cases to persons actually infected probably exceeds 1 to 100. Nearly all contacts of a poliomyelitis case in its infectious period become infected, they said, particularly if the contacts are young children or members of the patient's family.

From Buffalo came the report that in low rental areas, when environmental factors apparently affect the intensity of exposure to the virus, the disease seems to attack a relatively younger segment of the population. Wendell R. Ames, M.D., M.P.H., Deputy Commissioner of Health for Erie County, based his report on age specific attack rates during outbreaks in 1939, 1944, and 1949.

Geographical Distribution Mapped

Jacques M. May, M.D., Chief of the Department of Medical Studies of the American Geographic Society, described a map—developed from more than 1,000 sources—which depicts the distribution of poliomyelitis throughout the world since 1900.

It presents three basic types of disease information which may be related to geographic factors: absence or presence of poliomyelitis in any given area; rates, dates, and frequency of occurrence; and age groups most susceptible. Dr. May said the present map offers a challenge to scientists to interpret correctly the significance and relationship, if any, of such factors in epidemic outbreaks of poliomyelitis.

Although three serologically distinct types of the Coxsackie group of viruses have not proved pathogenic for Cynomolgus monkeys, the active agents have been recovered from the sera, nasal washings, and feces after inoculation by intracerebral, intracutaneous, intramuscular, intranasal, and intravenous routes, Beatrice F. Howitt and Velma J. Nichols, of the Laboratory for Virus Identification of the PHS Communicable Disease Center, reported to the Laboratory Section. The viruses were isolated 7 hours after inoculation and continued to be present 5 to 7 days later.

Inoculation of mixtures of Coxsackie and poliomyelitis viruses resulted in the usual course of either agent without interference. Both viruses were recovered from the nervous tissue of the monkeys succumbing to the poliomyelitis virus after intracerebral or intranasal injection. Both Coxsackie and poliomyelitis viruses were recovered by passage of nervous tissue, but not intestinal contents, to a second group of monkeys, the scientists reported. Monkeys injected with Coxsackie viruses were susceptible to subsequent intracerebral inoculation of Brunhilde and Lansing strains of poliomyelitis virus, they said. The scientists added that when Coxsackie and poliomyelitis viruses were injected simultaneously, antibodies for both viruses were present in the blood stream.

TERRAMYCIN

New Weapon Against Infectious Disease

Infectious disease is meeting a new and serious challenger in terramycin, APHA laboratory members learned while discussing new developments in antibiotics.

Gladys Hobby, Ph.D., Bacteriologist for Pfizer and Company, Brooklyn, said that as more and more antimicrobial agents come into use the choice of the proper one becomes of paramount importance, and the proper use of one agent in combination with another offers infinite possibilities for the control of infectious disease in man. Speaking primarily of terramycin, she pointed out that since it became available on an experimental basis in the United States, 10 months ago, its use has been increasingly widespread, and experimental clinical studies have indicated its usefulness in a wide variety of infections. The broad antimicrobial spectrum of terramycin, combined with its low toxicity and its rapid absorption in the body, naturally suggests that the drug should be of special value in the treatment of a wide variety of infections.

Pneumonias and Brucellosis

Terramycin has proved effective in treating both bacterial and viral types of pneumonia. Although no specific action has been demonstrated against the virus of influenza or the common cold, the strong antimicrobial action of terramycin against both the gram-positive and gram-negative microorganisms, as well as its high concentration in sputum, have made it of value in the control of many other respiratory infections, she said.

Terramycin is effective against staphylococcal and streptococcal infections, against infections from the *Shigella* group of organisms, and in the treatment of gonorrhea. Marked improvement in severity of the illness within a few hours after the initiation of therapy has been noted in proved cases of brucellosis. It appears to be effective in the control of many types of urinary tract infections.

Dr. Hobby reported, also, that terramycin is active against certain of the rickettsiae, and appears effective in the treatment of scrub, epidemic, and murine typhus, and in Q fever. It is effective, furthermore, against lymphogranuloma venereum, granuloma inguinale, trachoma, and a variety of other infections.

100 Percent Effective Against Amebiasis

In hospitals and institutions where the incidence of amebiasis is significant, simultaneous mass treatment by terramycin can control the infection, reported Harry Most, M.D., of the Departments of Medicine and Preventive Medicine, New York University-Bellevue Medical Center. Dr. Most and his collaborators (John E. Tobias, John Bozicevich, and Lucy V. Reardon, all of the Laboratory of Tropical Diseases of the Microbiological Institute, NIH) found that terramycin was 100 percent effective against amebiasis.

On the basis of multiple stool examinations, the team found the apparent effectiveness of the three antibiotics 2 weeks after cessation of therapy was: terramycin, 100 percent; aureomycin, 100 percent; and bacitracin, 59 percent. Two and one-half months after cessation of therapy the effectiveness was: terramycin, 100 percent; aureomycin, 60 percent; and bacitracin, 28 percent. Further post-treatment stool examinations were not performed on the patients treated with aureomycin and bacitracin. However, stool examinations performed 6 months after terramycin therapy revealed an apparent effectiveness of 100 percent for this drug. The prevalence of *E. histolytica* infections in the untreated control group remained the same during the 6-month period.

INFLUENZA

Immunological Adjuvants Offer Vaccine Hope

Results of influenza vaccination studies in monkeys and preliminary observations in man encourage further explorations for devising a practicable combination of virus plus a mineral oil adjuvant, Jonas E. Salk, M.D., of the Virus Research Laboratory, University of Pittsburgh School of Medicine, reported to the Epidemiology Section.

He said that the marked enhancement and persistence of the antibody inducing effect which was attributable to intramuscular use of the adjuvant had been confirmed in chickens, mice, and monkeys without undesirable local reactions. Even minute quantities of virus mixed with adjuvant induced good antibody responses.

TUBERCULOSIS

Case Fatality Affected by Admission Stage

White patients diagnosed as having active pulmonary tuberculosis lived three times as long as nonwhite patients, a study of 1,672 patients admitted to the Henry Phipps Institute in Philadelphia during the 20 years from 1926 to 1945 shows, Russell E. Teague, M.D., Assistant Director of the Institute, told the Epidemiology Section.

He pointed out that the race factor and the stage of disease on admission were the only bases on which significant differences in fatality rates were found. Economically, the group studied was homogeneous, being drawn from the lowest income area of the city; 703 of the patients were white, 969 nonwhite; 867 male, 805 female. Their mean age at the time of diagnosis was 30.3.

There was little difference in the length of life between males and females, and between patients 15–30, 31–46, and over 46 years of age on admission, and no consistent change in fatalities between the two decades, 1926–35 and 1936–45. But the fatality rate for nonwhite patients was 287 per 1,000 person-years of observation, whereas for whites it was 89.2; and it was 39.8 for patients diagnosed at the minimal stage of the disease, 100.9 for the moderately advanced, and 902.1 for the far advanced.

Chest X-rays and Cancer

In a 70-mm. film chest X-ray survey of 156,724 people, 307 showed findings of suspicious chest malignancy and 14 were confirmed, G. Howard Gowen, M.D., Chief of the Division of Cancer Control, and Bernard Frank, B. S., Illinois Department of Public Health, reported. They felt that chest X-ray screening is the only hope at present of discovering early cases of primary lung cancer.

Discussing problems of growing tubercle bacilli directly from specimens, Edgar M. Medlar, M.D., Chief of Laboratory at Veterans' Administration Hospital, Sunmount, N. Y., reported to the Laboration Section that the absence of tubercle bacilli in sputum often does not indicate either the absence of a sloughing necrotic tuberculous lesion or a paucity of bacilli in such a lesion. The numbers of bacilli in sputum may or may not be indicative of the bacillary count of the pulmonary lesions. Dr. Medlar and his associates (Sidney Bernstein and Frederic C. Reeves) felt that conversion of sputum from positive to negative should not be interpreted as indicating healing of the pulmonary disease, and a reverse shift does not necessarily indicate an imminent clinical increase of the disease. The sporadic demonstration of tubercle bacilli in sputum should be interpreted as evidence of a draining unhealed pulmonary lesion although the individual concerned may be well clinically.

ULTRAVIOLET LIGHT

Respiratory Illnesses Unaffected

Two attempts to measure the effect of ultraviolet light upon upper respiratory infections were reported to the Epidemiology Section. In New Haven, the upper air of eight classrooms was irradiated. Abraham Gelperin, M.D., Director of the Bureau of Communicable and Venereal Disease Control of the City Health Department, with Assistant Epidemiologist Morris A. Granoff, M.D., and Health Officer Joseph I. Linde, M.D., analyzed absences due to respiratory tract infections in the irradiated schools and in control groups.

Results ranged from a statistically significant increase in disease to the reverse when populations of the eight irradiated schools were compared with control groups in schools of comparable socioeconomic levels. "The results of this experiment are not conclusive," the team reported, and emphasized the difficulties inherent in the study and evaluation of control methods of respiratory tract diseases.

From Pleasantville and Mt. Kisco, N. Y., came another study of acute respiratory illness. Jean Downes of the Milbank Memorial Fund reviewed the investigation carried on in cooperation with Dr. Mildred W. Wells of the Westchester County Department of Health, who initiated a study of the channels of flow of measles and chicken pox in the two communities.

From the data of acute respiratory illness observed in families during three school years (September 1946 to May 1949), Miss Downes concluded that the introduction of ultraviolet lights in the Pleasantville schools and other places where children congregate did not affect the illness rates. Also, there was no evidence that the seasonal or weekly incidence of such illness among school-age children was affected in any way. In fact, the two communities were strikingly similar in this respect.

SYPHILIS SEROLOGY

False Positive High in Central America

Certain serology test methods for syphilis that have proved reliable in the United States are giving a high percentage of false positive reactions in Central America. Apparently, the false reactions are due to differences in climate, geography, diet, and chronic infections and infestations, Genevieve W. Stout, M.A., Serologist at the Pan American Sanitary Bureau Venereal Disease Laboratory in Guatemala, and John C. Cutler, M.D., of the PHS Venereal Disease Division, reported to the Laboratory Section.

At present, in the United States, comparative results show that serologic tests using lipoidal antigens, as well as those using cardiolipin antigens, are satisfactory. But in Guatemala and Panama there is an important difference in reactivity of the older tests using lipoidal antigens, such as the Kahn, Mazzini and Eagle, and the new tests using cardiolipin antigens. The Institute of Nutrition of Central America and Panama and its field teams are conducting serological tests on controlled groups who are being given detailed physical, nutritional, hematological, and biochemical examinations in an effort to establish data that can be closely studied for suggestions as to the etiology of the presumably false positive reactions.

It was the view of Miss Stout and Dr. Cutler that the high incidence of presumably false positive reactions in Central America offers unusual opportunity for investigation of an extremely important world health program. They said that tests using cardiolipin antigens will be evaluated officially for the first time at the International Serological Conference now being organized by the Subcommittee of Serology of the World Health Organization, and which will probably take place in Europe early in 1952.

GAS GANGRENE

"Bursting Factor" Offers Hope of Vaccine

A vaccine against gas gangrene may be possible as the result of laboratory discovery of a new substance almost invariably found in pathogenic cultures of the perfringens bacillus, it was reported to the Laboratory Section by Victorien Fredette, D.Sc., AssociateDirector of the Institute of Microbiology and Hygiene of the University of Montreal.

The new substance is called the "bursting factor" because it initiates gas gangrene when added to doses of washed perfringens bacilli which are by themselves inoperative. Commonly used filters remove or destroy the substance. Only the use of fritted glass filters permits the preparation of the "bursting factor."

Dr. Fredette surmised that since this substance is almost invariably found in pathogenic cultures, whether or not they contain alpha-toxin, it might represent the fundamental agent underlying the characteristic pathogenesis of gas gangrene, at least more so than toxin.

With this hypothesis in mind, several groups of guinea pigs were immunized with multiple doses of the "bursting factor." In 2 groups of 15 animals, 100 percent survival was obtained when challenged by doses of bacilli which killed 58 percent and 80 percent of the controls.

FOOD POISONING

Staphylococcus Role Shows Cleanliness Need

More than half of the 34 outbreaks of food poisoning examined by Don M. Griswold, M.D., Medical Consultant for the Mississippi State Board of Health, were caused by the heretofore little-suspected staphylococcus toxin which may, and does, contaminate food at all times, the Epidemiology Section was told.

The staphylococcus organism is present on the skin of the hands at almost all times, indicating the necessity for high standards of cleanliness in the handling, preparation, and serving of food. Of the 19 outbreaks of illness labeled food poisoning and found to have resulted from the presence of staphylococcus toxin, 13 were traced directly to the consumption of cream-filled pastries. In 3 of the 19 cases, the toxin was transported by "creamed" sauce or gravy which had been applied to meat or potatoes.

Nearly 18 percent of the 34 outbreaks were traced to the *Salmonella* organisms. Seven of the 34 outbreaks were due to chemical contaminations, resulting from commercial or manufacturing processes.

Dr. Griswold felt the data indicated not only the need for extreme cleanliness in food handling but also the study of certain industrial processes, sound training in bacteriology and chemistry, research into the natural habitat of pathogens, and clinical acumen in identifying pathological conditions.

In another report on food poisoning, Leo Cravitz, Dr.P.H., and James Gillmore, B.S., of the Rochester General Hospital, found that *Clostridium welchii* (perfringens) tested in man and young cats by oral administration produces an enterotoxin with symptoms of acute food poisoning.

Reduced to the Vanishing Point

A careful review of reported malaria mortality and morbidity, of diagnostic and survey blood examinations, and of case appraisals all support the contention that endemic malaria has been reduced to the vanishing point. But these data are not considered sufficiently extensive to prove that malaria has been eradicated from this country, APHA epidemiologists heard from Justin M. Andrews, Sc. D., Deputy Officer in Charge of the PHS Communicable Disease Center.

Since the 1933–37 epidemic, reported malaria deaths have maintained a regular trend downward in the Nation and in the 13 States participating in the National Malaria Eradication Program, according to Dr. Andrews and his associates (Griffith E. Quinby, M.D., M.P.H.; and Alexander D. Langmuir, M.D., M.P.H.). During the same period, reported malaria morbidity has diminished steadily in the Nation and in the eradication States except for the temporary increases due to the demobilization of service personnel infected overseas.

Residual DDT Spraying Proves Key

They pointed out that the basic operation of the program represented a complete change from previous malaria control activities. Larviciding, drainage, and programs to promote insect-proofing of houses were abandoned, and efforts were concentrated upon the use of indoor residual DDT sprays in areas where endemic malaria was known to be present or had been reported recently.

The principle of the program was very simple and had been demonstrated already in other parts of the world. Instead of trying to reduce the general abundance of anopheline mosquitoes, Drs. Andrews, Quinby, and Langmuir said, lethal measures were aimed specifically at the small proportion of anophelines that actually bite man. If these could be killed before they had the opportunity to bite humans a second time, malaria could not be transmitted.

Rates Closer to Zero than Supposed

Evidence from field investigations and appraisal of alleged malaria deaths and cases indicate that more of these now are being reported than can be verified, that the rates of decline of malaria mortality and morbidity actually are steeper than official reports indicate, and that both of these attributes currently are closer to zero than commonly is supposed, Dr. Andrews and his co-workers reported. Critical case appraisal of malaria morbidity reported during 1949 in seven States revealed the presence of only 19 instances which could not be explained on some basis other than transmission in this country.

Epidemic Potential Suggested

The known distribution of encephalitis and the number of recognized cases, plus the occasional major epidemics observed, widespread epizootics in horses, limited demonstration of control methods, and possible future changes in the balance of environmental factors suggest that these diseases may have an epidemic potential in North America, William C. Reeves, M.P.H., Ph.D., Associate Professor of Epidemiology in the School of Public Health and the Hooper Foundation for Medical Research, University of California, told the APHA Engineering Section and the Inter-American Association of Sanitary Engineering.

Three infections of particular importance are Western equine, Eastern equine, and St. Louis encephalitis. The natural history of these agents indicate a complicated infection chain based on completely inapparent infection in nature, Dr. Reeves said. This involves birds as hosts and mosquitoes as vectors, with mites or some unknown factor serving as a long-term reservoir. Inapparent infection may become a public health problem when the mosquito vector transfers the causative agent to clinically susceptible human hosts.

In most of North America, the need for, or advisability of, developing a control program cannot be evaluated until local health departments determine the extent and nature of the problem in their areas. Dr. Reeves pointed out, however, that in the epidemic and endemic areas where necessary studies have been made, a control program based on protection from mosquito vectors offers great promise.

Mosquito Control Indicated in Missouri Basin

Increased hazards from encephalitis are likely to accompany development of water resources in the Missouri River basin, and, since mosquitoes probably act as vectors of the viruses, the inclusion of antimosquito precautions in plans "would represent a wise course of action," Thomas A. Cockburn, M.D., John A. Rowe, Ph.D., and Edmund R. Price, D.V.M., of the PHS Midwestern Communicable Disease Center Services at Kansas City, predicted to the Epidemiology Section.

They reported that the largest epidemics of encephalitis in the United States in horses and man have occurred in the Missouri River basin. These include epidemics of St. Louis type in 1933 and 1937 in St. Louis, Western equine type in 1941 in the Dakotas and Minnesota, and the horse epizootics in 1912, 1937, and 1938. Reviewing the history of the infections in the 10-State area, they found no obvious correlation between the reported incidences of human and equine cases.

Medical Care

MEASURING QUALITY

Hospital Training Gauge to Quality

"The medical groups whose physicians had more years of hospital training belonged to groups in the classes of higher quality rating," stated Henry Makover, M.D., Medical Director of the Central Manhattan Medical Group, in his description of the methodology of a survey of medical groups associated with the Health Insurance Plan of New York.

"Very clear correlations between the quality ratings in this study and the hospital training of the groups' participating physicians were found," he said. Centralized physical facilities and adequate laboratories are another characteristic of medical groups with the higher ratings, he reported.

The study appraised, on a comparative basis, the quality of medical care furnished by the 26 medical groups operating under contract with the Health Insurance Plan and sought correlation between the quality ratings and significant aspects of operation. Ways for improving the quality of service were suggested. In approaching this task, Dr. Makover recognized the complexity of factors which affect the quality of medical care and the difficulty in defining "good medical care." The methods were devised to appraise the actual medical service received. Reliance was placed on data in clinical records. In addition, data relating to the organization of each group, volume of service, and qualification of physicians were collected.

Four kinds of records were studied: records of routine health examinations, pediatric records, records of patients with malignant neoplasm or suspected neoplasm, and records of patients with gastrointestinal illnesses. It was felt that management of these cases should provide a good index on the general quality of medical practice. A random sample of records in each category was assembled. Between 75 and 100 records were studied for each group. Clinical records were appraised according to acceptable medical performance with respect to the patients' chief complaint and adequacy of recording. Records of health examination were appraised according to adequacy of record and indicated follow-up procedures and conformity with procedures called for in the minimum medical standards of the Health Insurance Plan.

Groups were scored and divided into four classes according to their performance measured by record appraisal. Four medical groups fell into class I; nine into class II; eight into class III· and five into class IV. Groups falling in the first two classes serve much larger numbers of subscribers than do groups in the other two classes. From this, Dr. Makover concluded that the majority of the health insurance subscribers are receiving medical services of better than average quality. Number of services provided for each enrollee did not show a clear relationship to the quality rating unless the utilization rate was very low.

HEALTH INSURANCE

Cash No Substitute for Care

Group practice and regional organization of hospitals are the two methods holding greatest promise for the improvement of the quality of medical care, Franz Goldman, M.D., Associate Professor of Medical Care of the Harvard School of Public Health, said in discussing the lessons from voluntary and compulsory plans.

Dr. Goldman presented an over-all appraisal of the organizational and administrative experience of the two forms of health insurance and stated that the value of medical-care insurance depends on the degree to which it provides adequate service at a reasonable cost. "Cash is no substitute for care," he said.

To assure the highest quality of medical care, an effective "service organization" must be established close to each group of insured people, he maintained. Freedom of experimentation with group practice is imperative. Modern medical care insurance plans must be designed to preserve and promote health by preventive services, and to reduce serious illness by early diagnosis and prompt and thorough treatment.

Medical care insurance in itself does not constitute a broad health program, he asserted. It must be developed together with full-time health units furnishing the basic public health services, with a well-rounded hospital system, and with provisions for education of a sufficient number of competent health personnel. Careful, unbiased study of the vast experience with both voluntary and compulsory medical care insurance offers every country ample opportunity not only to avoid repetition of old mistakes but to select and improve the method of organization most suitable for its own requirements.

The criteria of adequacy for a medical care insurance plan can be met by a nonprofit medical care insurance program if it provides for comprehensive coverage without disease exclusions, or additional deterring charges, and if it serves family units through complete groups of general physicians and specialists.

This was indicated in the discussion of professional services under medical care insurance by George Baehr, M.D., President and Director of the Health Insurance Plan of Greater New York.

"An American business or industry or union welfare fund is at liberty to purchase any of the available plans for its workers, which, in its wisdom or ignorance, it considers most advantageous," Dr. Baehr stated. "The decision is usually based on one of two reasons—that the premiums are lower than those of any other available plan or that the medical benefits are comparatively greater. The average purchaser has as yet exhibited little interest in the scope and quality of the medical services which the workers as a whole will receive under the plan or in the ability of the plan to provide preventive medical services and early detection of disease. Coverage is often limited to employees in spite of the sometimes greater needs of the spouse and children."

Aims of Insurance Can Be Met

Medical care insurance is generally assumed to have a twofold purpose, Dr. Baehr stated. The first is to reduce the financial burdens of illness by spreading the cost through the medium of prepayment and the second, as a direct result of reducing the cost per individual, is to increase the utilization of medical services. In addition, he said there should be two other important aims: to improve the scope and quality of medical care for the insured population, and to promote the prevention of disease and facilitate its detection at an early stage when it can be cured or arrested.

The Health Insurance Plan of Greater New York is demonstrating that these objectives can be accomplished, he said, within limitations of a reasonable premium when the medical services are provided by group practice and premium income is distributed to the medical groups on a capitation basis. After 3½ years, 30 autonomous medical groups totaling almost 900 general physicians and specialists are providing comprehensive medical care under the Health Insurance Plan to more than 255,000 enrolled persons, including preventive services and visiting nurse service in the homes, without waiting periods or disease exclusions and without extra charges. The great majority of health insurance subscribers (about 211,000) are enrolled under 66,000 family contracts. The comprehensiveness of the program is indicated by the fact that the 255,000 enrolled persons are receiving approximately a million and a quarter professional services a year.

The rapid growth of voluntary insurance plans has changed the test of medical indigence from the postpayment of costs of medical care to the ability to prepay, Frank G. Dickinson, Ph.D., Director of the AMA Bureau of Medical Economic Research, stated in his discussion of the methods and rates of payment on voluntary health insurance plans. He said that only those persons who cannot afford the combined premium for both Blue Cross and Blue Shield membership are considered medically indigent today.

Average Four-Fifths of Total Bill

Some people have the notion, Dr. Dickinson stated, that voluntary health insurance plans pay only small claims, never more than a few hundred dollars for one illness. He pointed out that the largest claim paid in 1949 by a Blue Cross plan for hospital insurance was $5,578.80, about $650 less than the patient's entire hospital bill. The largest claim paid by a Blue Shield plan (for physician's fees) was $1,771, only $40 less than the bill the patient was required to meet.

The average family subscriber to Blue Cross hospital insurance plans is reimbursed for about four-fifths of the total hospital bills of the family. On the average, the Blue Shield family subscriber is reimbursed for one-half to three-fifths of the amounts paid to physicians. Blue Shield plans ordinarily do not cover home and office calls, a fact which lowers the percentage of reimbursement for the average family nember.

At the end of 1949, all types of voluntary health insurance protected 34,000,000 persons against loss of income while ill, 66,000,000 against hospital bills, 41,000,000 against fees for surgery and 17,000,000 for medical fees (other than surgical fees).

Plans Must Be Adequately Financed

"Adequate financing is fundamental if a medical care insurance plan is to achieve the objectives of a broad insurance coverage of the population, comprehensive insurance protection against burdensome medical costs, maintenance of high quality of care, fair payments to those who provide the services, and encouragement of future progress in medicine," stated I. S. Falk, Ph.D., Director of the Division of Research and Statistics of the Social Security Administration.

Dr. Falk outlined five tests used to examine the financing of medical care insurance: fair payments to providers of service; support of high quality care; financial stability and flexibility; adjustment of contributions to ability to prepay; and administrative economy and efficiency.

Dr. Falk maintained that some of the financial difficulties inherent in voluntary systems could be avoided by a compulsory system. Long range stability and effectiveness of a compulsory system would depend, he claimed, on adoption of the principle of gearing rates to income and by maintaining broad coverage.

In-Plant Services, Insurance Growing

Medical care programs for industrial workers—including in-plant health services, Blue Cross and Blue Shield Plans, and union programs—were discussed at a joint session of the Industrial Hygiene and Medical Care Sections. Ernest W. Miller, M.D., Medical Director of the Employees Mutual Benefit Association, Milwaukee Public Service Companies, reported on a program which provides both treatment of on-the-job injuries to 7,500 employees and complete medical care to these employees and their 20,000 dependents. General medical, surgical, and obstetrical care, financed by the employee benefit association, is provided in the Central Medical Office, the offices of district physicians, hospitals, and in the patients' homes. Monthly dues of $1.25 per employee member are matched by the employers. The over-all average cost of medical service, including fees for obstetrical services, amounted to $19.03 per member.

The role of commercial insurance companies in promoting the health of industrial workers through Workmen's Compensation and group policies was described by Leslie P. Hemry, Vice President and General Counsel of the American Mutual Liability Insurance Co. of Boston. He reported that on December 31, 1949, over 10 million workers were covered by group insurance against loss of income due to disability; over 17 million people, by group hospital expense insurance; 15 million, for group surgical expense insurance; and 2 million, for group medical expense insurance.

Blue Cross and Blue Shield

E. A. van Steenwyk, Executive Director of the Associated Hospital Service of Philadelphia, reported that arrangements have been made to enable Blue Cross and Blue Shield members to transfer their membership to similar plans in other areas without waiting periods or penalties. Blue Cross subscribers, if they become ill while away from home, may also receive service benefits from the Blue Cross Plan in that area. Another important development in the Blue Cross movement, he said, is the recently negotiated industry-wide contracts providing uniform benefits at uniform rates for employees in the steel and automobile industries in 40 or more States.

Mr. van Steenwyk concluded that the dynamic character and unlimited potential of these plans—Blue Cross today has 36 million subscribers—ensure that Blue Cross and Blue Shield Plans will continue to meet the medical care needs of the Nation.

Excellent opportunities for the coordination of preventive and therapeutic medicine are provided in newer medical programs for workers, according to E. Richard Weinerman, M.D., Medical Director of the Permanente Health Plan, Oakland, Calif., and Herbert K. Abrams, M.D., Chief of the Bureau of Adult Health, California State Department of Public Health. In effecting such coordination, the collective bargaining agreement is a potential ally of public health, although the current contract clauses on industrial health and safety and on prepaid medical care are almost always unrelated. In California, many union agreements now include specific industrial health measures, ranging from the protection of spray painters to the establishment of joint labor-management safety committees, and a few embody recommendations made by the State industrial hygiene agency. By February 1950, more than 112,000 workers were covered by health benefits under labor-management agreements, and an estimated 20,000 more, plus families, have been added since that date.

Harry J. Becker, Director of the Social Security Department of the United Automobile Workers Union, CIO, emphasized that organized labor has now given a higher priority than ever before to obtaining improved standards of medical service and better methods of meeting the cost of comprehensive medical care. Under collective bargaining programs, Mr. Becker said, hospitalization insurance, financed by the employer as a cost of doing business and provided through Blue Cross, will probably eliminate the entire economic burden of hospitalized illness for employed industrial workers. However, the necessity to use existing cash indemnity plans for physician care has meant that the adequacy and quality of medical care has not changed nor can it be expected to change under these programs as now constituted. Labor's gains under collective bargaining will force needed action through voluntary plans or through governmental action, or more probably through a combination of both, he felt.

GROUP PRACTICE

Not an Organization, but a Process

Group medical practice is a way of life and an attitude toward health service, not merely an administrative device to increase quality, reduce costs, or stabilize medical income, C. Rufus Rorem, Ph.D., C.P.A., Executive Director of the Hospital Council of Philadelphia, told the APHA joint sessions on Medical Care.

In his discussion of the patterns and problems of group medical care, Dr. Rorem stated that the public does not distinguish between functions of diagnosis and treatment and wishes to receive complete medical care from the same medical organization.

He pointed out that group medical practice is being developed in order to coordinate the special knowledge and skill of individual practitioners, and to assure effective utilization of expensive diagnostic and treatment facilities. It makes possible common interest of a number of physicians in the care of individual patients.

Dr. Rorem described many features of group practice, including specialized professional qualifications of the practitioners; contiguity of professional office with availability for regular and frequent consultations concerning individual patients; joint use of supplementary services; some joint ownership of equipment, apparatus, or buildings; cooperative, rather than competitive division of total income among the group.

The development of group medical practice will be dependent upon the degree to which doctors consider such activities favorable to their immediate and long-run self-interest, he said. Opportunity for unfettered professional service is a greater factor than total income.

Rather than a form of organization, group medical practice is a process of "evolution" which is developing gradually. It follows a series of "revolutions" in medical science. Group medical service is being developed to coordinate the specialized knowledge and skill of individual practitioners, and to utilize effectively the public's investment in diagnostic and treatment facilities, including hospitals. But a "cultural lag" still remains between what is known and what is being done about it.

JOINT HOUSING

Two Services Under One Roof

With the narrowing of the gap between curative and preventive medicine has come another progressive step—the housing of the local health department and a hospital under the same roof, said Anthony J. Borowski, Dr.P.H., Chief of the Division of Hospital Facilities of the Ohio Department of Health, speaking before a combined session of the Health Officers, Laboratory, and Medical Care Sections.

Dr. Borowski pointed out that a union of these two types of service under one roof can be effected only after a thorough airing of the benefits to be derived, the points of possible conflict, complete explanation to the public, and a sympathetic and cooperative attitude of each of the two services toward the other. In addition, there must be careful physical and procedural planning to keep the health center out of the basement, close to hospital adjunct services such as laboratory, X-ray, pharmacy, and in a position where there can be cooperation between the personnel of the two organizations in the fields of nursing, diet, maternal and child hygiene, and the like.

Ten years' experience in joint housing of a hospital, health department, and a laboratory was reviewed by William A. Harris, M.D., M.P.H., Deputy Maryland State and Charles County Health Officer. It has been his experience that through frequent contacts between the health officer and practicing physicians who regularly visit patients in the hospital a close working relationship has developed.

Benefits Both Departments

The health officer and the nurse superintendent of the hospital confer frequently. They have found that many problems are joint and are jointly solved. The laboratory is a branch unit of the State health department and serves both the county health department and the hospital. It is supported mainly by the health department, but alone neither the department nor the hospital could afford the laboratory. All thoughts of expansion have joint housing in mind.

As a hospital administrator, E. Dwight Barnett, M.D., Director of Harper Hospital in Detroit, pointed out that one of the functions of hospitals is to foster community public health and preventive medicine programs. Although many hospitals would like to carry out this function to the fullest, they sometimes find a lack of interest on the part of health departments.

In 1948, Dr. Barnett recalled, a joint committee of the American Hospital Association and APHA developed a policy, later approved, suggesting that both groups work closely together for community health. The Hill-Burton Act has helped bring hospitals and health departments under the same roof. Whenever joint housing is possible, it will improve the efficiency of both departments. Although this close cooperation has started in rural areas, full advantage of it has not been taken in the larger cities, he said.

Approval is General

Under the Hospital Planning and Construction Act, over 250 health centers have been approved, and about 50 of these are being planned in connection with hospital facilities, Milton Terris, M.D., M.P.H., Staff Director of the Subcommittee on Medical Care of the APHA, commented in reporting on a survey of joint housing.

He reviewed studies of 24 local health units where joint housing—and in some cases joint administration—is in effect. The majority of health officers interviewed felt that the greatest single advantage of joint housing was the opportunity it provides for close contact with practicing physicians and the hospital staff. The major disadvantage was found to be confined to the combined units in which the health department is housed in the hospital building—this largely related to pressure on space.

The great majority of the health officers considered that the advantages of joint housing outweigh the disadvantages, while only 3 of the 24 health officers expressed opposition to joint housing on the basis of their experience. Practically all of the hospital directors interviewed likewise expressed approval of joint housing. Dr. Terris felt there was little doubt, on the basis of this survey, that the location of hospitals and health departments in close proximity is a valuable means of facilitating the coordination of preventive and curative medicine in the interest of better health service for the individual and the community.

MEDICAL FACILITIES

Research Centers Pose Environmental Problems

Placing patients in close physical relationship to research teams and their laboratories is an important development in modern research centers. As a result, new problems have been precipitated in construction, equipment, and operation which are of direct concern to engineers, Donald L. Snow, PHS Sanitary Engineer, National Institutes of Health, told the Engineering Section.

He noted that medical research programs often involve large numbers of animals, the handling of pathogenic, toxic, inflammable, corrosive, and radioactive materials. These inherent hazards become even more serious when they occur near nursing units. Prudent planning and experienced administration can reduce these hazards.

We need to emphasize the desirability of keeping in the planning foreground those environmental requirements bearing on the health, safety, and physical comforts of a hospital research center. Mr. Snow illustrated his theme with examples from the PHS Clinical Center now under construction which will accommodate 500 patients and over 1,000 laboratory modules. He spoke of the design of nursing units, flexibility in laboratories, centralization of services, and safeguards for special activities.

Study Conflicting Interests

To provide a healthful and relaxing atmosphere for the patients, conditions of convenience and utility for the staff, and a structure safe for all demands an awareness of various and sometimes conflicting interests. Such basic concepts as placing nursing units in the general vicinity of laboratory operations can set off a literal chain reaction of problems. Their consequences can affect not only the structural, air-conditioning, and equipment design, but the selection of interior finishes, what housekeeping procedures must be modified, and even what types of waste containers should be used and how wastes are to be disposed of ultimately.

To gain real acceptance, it is imperative that each feature, prescribed for reasons of health and safety, be measured as to how it fits into the hospital research center's operational pattern. To this end, sanitary engineers and other sanitation workers can fill a unique role by thinking in more intimate terms of both the environmental and operating problems of our modern medical centers. Here they can help bring together, through both observation and subsequent research, areas of deficient information. Finally, they can vigorously insist that in the building-planning stage their studied recommendations be weighed fairly in the economic-health balance, Mr. Snow said.

Incidence of Disease

No health department, State or local, can effectively prevent or control disease without knowledge of when, and under what conditions cases are occurring

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UNITED STATES

Reports from States for Week Ended November 25, 1950

Measles

For the current week 2,026 cases of measles were reported as compared with 1,286 for the same week last year, and a 5-year (1945–49) median of 1,936 cases. The States reporting the largest number during the current week were Wisconsin (389), Missouri (210), California (145), Kentucky (145), Ohio (144), and Illinois (120).

Influenza

Approximately the same number of new cases was reported for the current week (2,000) as compared with the same week last year (1,997). Seventy-four percent of the total occurred in Texas and Virginia. Hawaii reported 128 cases during the current week as compared with 544 for the previous week.

Comparative Data For Cases of Specified Reportable Diseases: United States

[Numbers after diseases are International List numbers, 1948 revision]

Disease	Total for week ended—		5-year median 1945–49	Seasonal low week	Cumulative total since seasonal low week		5-year median 1944–45 through 1948–49	Cumulative total for calendar year		5-year median 1945–49
	Nov. 25, 1950	Nov. 26, 1949			1949–50	1948–49		1950	1949	
Anthrax (062)	1	-----	(1)	(1)	(1)	(1)	(1)	42	47	(1)
Diphtheria (055)	116	240	380	27th	2,296	3,410	4,594	5,424	7,178	10,891
Acute infectious encephalitis (082)	29	8	9	(1)	(1)	(1)	(1)	915	710	587
Influenza (480–483)	2,000	1,997	2,167	30th	22,433	18,484	19,245	268,692	94,351	162,233
Measles (085)	2,026	1,286	1,936	35th	12,700	8,942	12,596	300,871	597,460	572,953
Meningococcal meningitis (057.0)	64	58	59	37th	601	574	574	3,400	3,090	3,128
Pneumonia (490–493)	1,070	1,229	-------	(1)	(1)	(1)	(1)	73,251	69,868	------
Acute poliomyelitis (080)	569	506	366	11th	[2]30,229	40,096	23,794	[2]31,360	41,009	21,261
Rocky Mountain spotted fever (104)	2	3	3	(1)	(1)	(1)	(1)	451	558	518
Scarlet fever (050)	1,021	1,183	1,721	32d	9,321	10,049	12,978	49,491	67,715	74,613
Smallpox (084)	4	1	2	35th	7	5	8	33	46	155
Tularemia (059)	10	9	21	(1)	(1)	(1)	(1)	[3]802	1,003	873
Typhoid and paratyphoid fever (040, 041)[4]	49	47	59	11th	2,694	3,150	3,150	3,203	3,638	3,638
Whooping cough (056)	1,640	1,904	2,011	39th	13,066	12,701	13,810	110,261	59,303	89,685

[1] Not computed.

[2] Deduction: Michigan, week ended October 7, 1 case. Addition, Iowa, delayed report, 33 cases.

[3] Deduction: Arkansas, week ended November 4, 1 case.

[4] Including cases reported as salmonellosis.

Other Diseases

Four cases of smallpox were reported in Kansas for the current week. There was one case of anthrax in New Jersey. A substantial decrease in number of poliomyelitis cases has occurred, 569 cases for the current week as compared with a total of 958 cases for the previous week. The total number reported since the seasonal low point in 1950 is 30,229 as compared with 40,096 in 1949.

Reports of Epidemics

Keratoconjunctivitis

Dr. R. O. Saxvik, State Health Officer, North Dakota, has reported that 89 cases of keratoconjunctivitis were reported in Minot and vicinity. All cases were reported by two ophthalmologists in Minot, and the diagnosis of several source cases was confirmed at the University of Minnesota.

Rabies in Man

Dr. George W. Cox, State Health Officer, Texas, has reported that the current rabies epizootic in El Paso has resulted in a human death from rabies on November 4, 1950. There have been approximately 1,000 rabid animals reported in Texas as a whole since January 1, 1950.

Deaths During Week Ended November 25, 1950

	Week ended Nov. 25, 1950	*Corresponding week, 1949*
Data for 90 large cities of the United States:		
Total deaths	8, 281	8, 515
Median for 3 prior years	8, 515	----------
Total deaths, first 47 weeks of year	414, 806	415, 434
Deaths under 1 year of age	527	582
Median for 3 prior years	582	----------
Deaths under 1 year of age, first 47 weeks of year	27, 964	29, 387
Data from industrial insurance companies:		
Policies in force	69, 644, 678	70, 023, 632
Number of death claims	10, 522	10, 854
Death claims per 1,000 policies in force, annual rate	7. 9	8. 1
Death claims per 1,000 policies, first 47 weeks of year, annual rate	9. 2	9. 1

Reported Cases of Selected Communicable Diseases: United States, Week Ended November 25, 1950

[Numbers under diseases are International List numbers, 1948 revision]

Area	Diphtheria (055)	Encephalitis, infectious (082)	Influenza (480–483)	Measles (085)	Meningitis, meningococcal (057.0)	Pneumonia (490–493)	Poliomyelitis (080)
United States	**116**	**29**	**2,000**	**2,026**	**64**	**1,070**	**569**
New England	**2**		**1**	**67**	**3**	**41**	**18**
Maine				3	2	7	1
New Hampshire			1	13		1	
Vermont				1			1
Massachusetts	2			41	1		10
Rhode Island				1		1	2
Connecticut				8		32	4
Middle Atlantic	**3**	**1**	**4**	**220**	**11**	**350**	**107**
New York	1	1	[1] 3	83	5	278	89
New Jersey			1	43	1	27	8
Pennsylvania	2			94	5	45	10
East North Central	**7**	**5**	**35**	**711**	**11**	**114**	**141**
Ohio	3	1	11	144	6		43
Indiana	1	1	2	15		29	13
Illinois	1	1		120	1	56	36
Michigan	2	1	1	43	3	21	40
Wisconsin		1	21	389	1	8	9
West North Central	**4**	**1**	**6**	**269**	**8**	**49**	**54**
Minnesota	1			11	1	22	15
Iowa	1			5	1	1	7
Missouri	2		3	210	1	10	8
North Dakota		1		15	2	8	1
South Dakota							7
Nebraska					1		4
Kansas			3	28	2	8	12
South Atlantic	**35**	**1**	**232**	**45**	**12**	**77**	**60**
Delaware					1		
Maryland				4		17	7
District of Columbia				1		8	2
Virginia	3		177	9	6	26	11
West Virginia			30		2		3
North Carolina	11	1		26	3		11
South Carolina	3		7	1		5	4
Georgia	13		17	2		10	9
Florida	5		1	2		11	13
East South Central	**22**	**3**	**42**	**178**	**5**	**51**	**25**
Kentucky	4			145	1	15	5
Tennessee	8	2	14	21	1		10
Alabama	8		13	1		15	4
Mississippi	2	1	15	11	3	21	6
West South Central	**33**	**4**	**1,450**	**125**	**8**	**280**	**40**
Arkansas	7	1	95	26		29	8
Louisiana	2		2	5		20	3
Oklahoma	2	1	46	3	1	14	6
Texas	22	2	1,307	91	7	217	23
Mountain	**3**	**1**	**208**	**188**		**29**	**23**
Montana	1	1	1	2			1
Idaho			4	20			2
Wyoming				2			1
Colorado	2		29	102		3	8
New Mexico				28		3	2
Arizona			174	15		23	5
Utah				19			4
Nevada							
Pacific	**7**	**13**	**22**	**223**	**6**	**79**	**101**
Washington	1		1	66	1	2	25
Oregon	1		7	12		11	12
California	5	13	14	145	5	66	64
Alaska							
Hawaii			128				

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[1] New York City only.

Anthrax: New Jersey, 1 case.

Reported Cases of Selected Communicable Diseases: United States, Week Ended November 25, 1950—Continued

[Numbers under diseases are International List numbers, 1948 revision]

Area	Rocky Mountain spotted fever (104)	Scarlet fever (050)	Smallpox (084)	Tularemia (059)	Typhoid and paratyphoid fever [1] (040, 041)	Whooping cough (056)	Rabies in animals
United States	**2**	**1,021**	**4**	**10**	**49**	**1,640**	**72**
New England		**108**			**3**	**290**	
Maine		24			1	110	
New Hampshire		12			2	4	
Vermont		4				31	
Massachusetts		54				85	
Rhode Island		2				39	
Connecticut		12				21	
Middle Atlantic		**98**			**10**	**258**	**17**
New York		[2] 62			6	100	15
New Jersey		7			1	60	
Pennsylvania		29			3	98	2
East North Central		**286**		**2**	**6**	**426**	**7**
Ohio		102			2	64	5
Indiana		18		1	2	25	
Illinois		45			1	39	1
Michigan		97		1	1	114	1
Wisconsin		24				184	
West North Central		**46**	**4**		**3**	**84**	**6**
Minnesota		12				6	1
Iowa		1				10	3
Missouri		15			3	17	
North Dakota		1				3	
South Dakota		2				1	
Nebraska		1				12	
Kansas		14	4			35	2
South Atlantic	**2**	**159**		**4**	**13**	**204**	**10**
Delaware						11	
Maryland		7			1	25	
District of Columbia		4			1	7	
Virginia		22			2	70	3
West Virginia		11			1	11	
North Carolina		92			1	50	
South Carolina		6			1	9	5
Georgia	2	13		3	4	12	2
Florida		4		1	2	9	
East South Central		**104**		**1**	**1**	**63**	**12**
Kentucky		15				14	4
Tennessee		49				27	3
Alabama		25		1		20	4
Mississippi		15			1	2	1
West South Central		**58**		**1**	**7**	**160**	**20**
Arkansas		4		1	1	25	2
Louisiana		5			1	2	
Oklahoma		10			2	9	
Texas		39			3	124	18
Mountain		**29**		**2**	**3**	**97**	
Montana		3		2		21	
Idaho		1				5	
Wyoming						7	
Colorado		9				14	
New Mexico					2		
Arizona		5				49	
Utah		11				1	
Nevada					1		
Pacific		**133**			**3**	**58**	
Washington		48				18	
Oregon		8				9	
California		77			3	31	
Alaska						11	
Hawaii							

---

[1] Including cases reported as salmonellosis.

[2] Including cases reported as streptococcal sore throat.

FOREIGN REPORTS

CANADA

Reported Cases of Certain Diseases—Week Ended November 11, 1950

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox	------	------	20	1	137	348	51	109	94	124	884
Diphtheria	------	------	------	------	3	------	------	1	------	------	4
Dysentery, bacillary	------	------	------	------	3	2	------	------	------	10	15
Encephalitis, infectious	------	------	------	------	------	------	1	------	------	------	1
German measles	------	------	------	------	4	28	2	14	23	26	97
Influenza	------	------	22	------	------	8	3	------	------	------	33
Measles	1	------	3	------	260	558	23	1	21	79	946
Meningitis, meningococcal	------		------	------	2	3	1	1	------	------	7
Mumps	1	------	4	------	56	242	16	69	157	43	588
Poliomyelitis	------	------	------	1	2	4	------	------	2	------	9
Scarlet fever	9	------	------	1	40	35	28	10	61	23	213
Tuberculosis (all forms)	3	------	4	13	68	14	16	5	11	38	172
Typhoid and paratyphoid fever	2	------	------	------	2	1	------	------	1	1	7
Venereal diseases:											
Gonorrhea	6	------	1	4	68	70	19	17	52	75	312
Syphilis	1	------	4	6	51	15	5	5	4	10	101
Primary	------	------	------	1	1	4	------	4	1	1	12
Secondary	------	------	------	------	2	------	------	------	3	------	5
Other	1	------	4	5	48	11	5	1	------	9	84
Whooping cough	------	------	2	11	59	111	27	------	1	18	220

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

Burma. During the week ended November 4, 1950, 11 cases of cholera were reported. For the weeks ended October 21 and 28, 20 and 3 cases, respectively, were reported.

Cambodia. Six cases of cholera were reported in Kratie Province for the week ended November 11, 1950. These are the first cases reported in that province.

India. For the week ended November 18, 1950, 10 cases of cholera were reported in Tiruchirappalli. During the weeks ended November 4 and 11, 3 and 2 cases, respectively, were reported. Cholera was reported in other localities for the week ended November 18 as follows: Calcutta 45 cases, Madras 22 cases, and Nagapatinam 7 cases.

Plague

Madagascar. During the period October 21–31, 1950, 7 cases (7 deaths) of plague were reported in the provinces of Madagascar, and 7 cases (5 deaths) were reported for the period November 1–10.

Smallpox

Indonesia. During the week ended October 21, 1950, three cases of smallpox were reported in Pontianak, Borneo. Smallpox was reported on the island of Java as follows: Week ended October 28, 1 case in Cheriban; week ended November 4, 3 cases in Bandoeng; week ended November 11, 24 cases in Surabaya.

Iran. Seven cases of smallpox were reported in Iran during the week ended November 18, 1950.

Nigeria. During the week ended October 7, 1950, 387 cases (47 deaths) of smallpox were reported as compared with 254 (77 deaths) for the previous week. In Lagos 6 cases were reported for the week ended October 7, compared with 3 for the previous week.

Peru. There were 365 cases of smallpox reported during August 1950, 8 of which were reported in Arequipa.

Togo. For the period November 1–10, 1950, 16 cases of smallpox were reported in Togo.

Typhus Fever

Hawaii. During the week ended November 11, 1950, one case of typhus fever was reported in Honolulu.

India (Portuguese). During the week ended October 21, 1950, five cases of typhus fever were reported as compared with one for the previous week.

Peru. During August 1950, 146 cases of typhus fever were reported in Peru. Four of these cases were reported in Arequipa.

Yellow Fever

Peru. For the week ended June 20, 1950, two deaths resulted from jungle yellow fever in Tingo Maria, Huanuco Department, and for the period July 7–21, two additional deaths were reported. In San Martin Department one death was reported in Bellavista on June 13 and on June 19 one death was reported in Tarapoto. One death was reported July 22, 1950, in Pucalpa, Loreto Department.

Venezuela. On November 14, 1950, one fatal case of jungle yellow fever was reported in El Milagro, Tachira State. This case came from the jungle zone of San Camilo.

* * * *

QUARANTINE MEASURES

Certificates and procedures specified below are required for persons arriving in Egypt, Somaliland, Iraq, Lebanon, and Chile.[1]

Africa

Egypt. International cholera vaccination certificate for persons who transited India and Pakistan or boarded aircraft there in transit to or stopping at Cairo.

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[1] Prepared by the Division of Foreign Quarantine from information obtained from the Weekly Epidemiological Record of the World Health Organization, and other official sources.

Official certificate of stool examinations made on two successive days before departure from India or Pakistan for persons stopping at Cairo who transited those countries or boarded aircraft there. Persons without this certificate are quarantined at Cairo pending negative stool examination reports.

Somaliland (*Italian*). Cholera vaccination certificate attesting to second inoculation not more than 6 months or less than 6 days before entry for persons from India, Pakistan, or other cholera infected areas. Certificate must state number of vibrios per cc., and that minimum of 6,000 million vibrios was injected.

Smallpox vaccination certificate issued not more than 3 years or less than 14 days before arrival, for all travelers.

Typhus and typhoid fever inoculation certificates issued not more than 12 months before arrival, for all persons.

Yellow fever inoculation certificate issued not more than 4 years or less than 10 days before arrival, for all persons from yellow fever areas.

Arrivals from an infected area who stay in Somaliland are subjected to vaccination and surveillance in absence of above certificates. In-transit travelers lacking a valid certificate may continue journey if medical inspection reveals freedom from infection.

Asia

Iraq. Arrivals from Saudi Arabia must have valid cholera vaccination certificate; persons staying in Iraq are quarantined or placed under surveillance pending negative report of bacteriological tests; transit passengers are isolated until departure.

South America

Chile. Before receiving a visa to Chile, travelers must present a certificate of smallpox vaccination performed at least 15 days but not more than 3 years previously. Tourists not required to have a visa must present such a vaccination certificate on arrival in Chile.

—Examination—

Entomologists, Parasitologists, and Protozoologists

Examinations for scientists and sanitarians (entomologists, parasitologists, and protozoologists) in the Regular Corps of the Public Health Service will be held February 12–14, 1951, in various cities throughout the country. Completed applications must be in the Washington office by January 15.

Appointments are permanent and provide opportunities for career service in research and public health activities. Benefits include periodic pay raises and promotions; liberal retirement provision; medical care; annual and sick leave.

Appointments will be made in the grade of assistant and senior assistant, equivalent to Navy ranks of lieutenant, j. g., and lieutenant, respectively. Entrance pay is $4,486 for assistant (with dependents) and $5,346 for senior assistant, including rental and subsistence allowance.

Candidates must have at least 7 years of professional training and experience beyond high school, and must have, or expect to receive by November 1951, a master's or doctor's degree.

For application forms and additional information, write to: Surgeon General, United States Public Health Service, Federal Security Agency Washington 25, D. C. Attention: Division of Commissioned Officers.

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The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, Public Health Service, Washington 25, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington 25, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

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Public Health Reports

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PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
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Division of Public Health Methods
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Public Health Reports

Vol. 65 • DECEMBER 22, 1950 • *No. 51*

The Anthrone Blood Sugar Method Adapted to Diabetes Case Finding in a Multiple Screening Program

By R. H. Fetz, A.B., and Lester M. Petrie, M.D., M.P.H., F.A.C.P.*

With the decrease in the incidence of communicable diseases, and the resulting extension of the average life span in the United States, greater attention has been focused recently on the degenerative conditions commonly encountered in older age groups. Statistics show that heart disease, cancer, cerebral hemorrhage, nephritis, arteriosclerosis, and diabetes account for over half the deaths in this country today (*1*). Public health authorities have in the last decade become increasingly aware that diabetes, conveniently placed in the class of degenerative diseases, should be regarded as a major public health problem (*2*).

Much data are available concerning the prevalence of diabetes, and this phase of the subject is not extensively reviewed; however, certain statistics stand out and should be emphasized. In 1935–36, the National Health Survey (*3*) found that approximately 367 out of 100,000 individuals were known to have diabetes. Based upon a study made in Oxford, Mass., in 1947 by the Diabetes Section of the Public Health Service, it was found that the prevalence of diabetes was 2 percent of the individuals tested (*4*). Recent statistics published by the Metropolitan Life Insurance Company (*5*) indicate that the onset rate of diabetes is such that 4,350,000 of our present population will eventually have the disease. It is common knowledge that the early discovery of diabetes is desirable for the successful control and treatment of the disease. With these facts in view, the Georgia Department of Public Health in conjunction with the State and local medical associations and the Public Health Service has embarked on a program of diabetes case finding.

In order that the greatest number of individuals with impaired carbohydrate metabolism be found, it was desirable that a simple, accurate, and rapid method for the determination of blood sugar be provided, one that could be easily adapted to Georgia's county-wide mass tuberculosis and venereal disease screening program (*6, 7*).

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*From the Division of Industrial Hygiene, Georgia Department of Public Health, Atlanta, Ga.

After study of some of the blood sugar methods available (*8–12*), it appeared that the anthrone method recently developed by Dreywood (*13*) and modified by Durham et al. (*14*) might be most suitable for our purposes. The latter authors have established the reliability of the method by recovery experiments with blood and also by correlation with the Nelson-Somogyi "true glucose" method (*11*). Their findings have been reproducible in our laboratory. Hence, we accept as trustworthy their statement that the anthrone method "fulfills at least two criteria for an acceptable quantitative procedure: It allows the practically complete recovery of glucose added to blood specimens; and it gives results comparable with those obtained by the use of a standard and generally accepted method. . . . (It) represents a rare combination of ease and rapidity of operation with high precision in results "

Field Studies and Results

In the fall of 1949, the first field trials of this screening test were carried out in Twiggs and Lowndes Counties in industries where routine chest X-ray and blood serology surveys had previously been scheduled. The additional blood and urine [1] survey procedures were merely superimposed on that program. The initial investigations entailed analyses of the blood and urine sugar concentrations of 749 individuals.

The primary objectives of these studies were to test the mechanical adaptability of the screening procedure for field work and to determine the maximum rate at which analyses could be carried out. It was found that a rate of 100 individuals examined per hour could be maintained in the field by three nurses performing the venipuncture and one technician pipetting the aliquots of blood into the tubes containing the trichloroacetic acid necessary for deproteinization.[2] The tubes were then shipped to a central testing laboratory for completion of the analyses. The results of these preliminary screening tests are given in table 1.

Fifty-six individuals in the Lowndes County investigation were notified by mail to report in a fasting condition for further study on a selected date. Fifty-three of these individuals had shown a blood sugar screening level of more than 150 milligrams percent (170 mg. percent has subsequently been selected as a screening level); the other three were called back solely because of sugar in the urine. Fifty-two

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[1] Urinalyses by Clinitest method.

[2] This schedule is readily maintained by qualified and experienced personnel In preparing for mass surveys, several trial runs are necessary to develop teamwork.

Table 1. *Results of preliminary screening tests for blood sugar*

Blood sugar ranges, mg percent	Number individuals	Percent of total
Below 70	2	0 3
70–79	4	0. 5
80–89	12	1. 6
90–99	48	6. 4
100–109	127	17. 0
110–119	155	20. 7
120–129	159	21. 2
130–139	138	18. 4
140–149	49	6. 5
150–159	23	3. 1
160–169	13	1. 7
170–179	7	0. 9
180–189	4	0. 5
190–199	0	0. 0
200–above	8	1. 1
Total	749	100. 0

of the 56 individuals voluntarily reported for this glucose tolerance test. When they arrived at the testing station, personal case histories, as well as fasting blood and urine specimens, were obtained. This was followed by administration by mouth of 100 grams of glucose. Both blood and urine specimens were obtained at the end of 1- and 2-hour periods from the time the sugar was ingested. Of the 52 subjects who reported, 20 were found to have hyperglycemia. A summary of the findings obtained as a result of these glucose tolerance tests is presented in table 2.

Table 2. *Results of glucose tolerance tests*

Classification of findings of glucose tolerance tests	Number of individuals
1. Normal	27
2. Hyperglycemia with glycosuria	10
3. Hyperglycemia without glycosuria	10
4. Unclassified glycosuria without hyperglycemia	5

Of the 20 hyperglycemic individuals only 1 was previously known to have diabetes.

Ten of the subjects did not have sugar in the urine at any time during the sugar tolerance test. More information correlating urine and blood sugar values will be published in a separate report.

To date we have made no further study of the 20 individuals with hyperglycemia listed in table 2, nor the 5 individuals with glycosuria without hyperglycemia, all of whom appear to have some error in their carbohydrate metabolism. Each person has been referred to the physician of his choice for further study and diagnosis. Under these circumstances a positive diagnosis by us is unwarranted.

Further clinical investigation would be required to differentiate those cases due to other causes, such as hyperthyroidism, from the true cases of diabetes mellitus. Furthermore, it is anticipated that the findings from many thousands of examinations in mass case finding studies will soon be available which will give more significant data as to diabetes prevalence rates and trends.

Procedure

Preparation of Glassware

Clean 13-x 100-mm. pyrex test tubes for blood sugar and similar tubes for syphilis serology are serially numbered. The numbers are on labels[3] which have a pressure-sensitive adhesive back, making them transferable. The test tubes are placed in square cardboard boxes partitioned to hold 100. These are arranged from left to right in rows of 10 so that numbers 1 through 10 are on the first row, 11 through 20 on the second, etc. A label is attached to each box indicating the first and last serial numbers of the tubes contained therein.

The last two significant numbers are indicated in the box. The same box is used over and over again for any block of 100 serially numbered tubes. For example, the test tube serially numbered 57255 would be found in the box for tubes numbered from 57201 to 57300 in the position indicated as 55 in figure 1. Each time a box is filled a label is attached to it giving the lowest and highest serial numbers of the test tubes included.

An amount of 2.25 cc. of 5 percent trichloroacetic acid is then pipetted automatically into the boxed blood-sugar test tubes.[4] The numbered tubes are rubber stoppered and sent to the field station. Similar boxes containing syphilis serology tubes having corresponding numbers are sent with them.

Preparation and Storage of Reagents

The anthrone reagent, 0.2 percent, must be prepared from C. P. sulfuric acid (95 percent v/v) and twice recrystallized anthrone. The sulfuric acid used in this preparation should be at room temperature before admixture with the anthrone solid. Similarly, the prepared reagent should be used at room temperature.

Solutions of anthrone, if kept for several days, tend to darken slightly upon standing in the light at room temperature. For this reason, we have found it advisable to prepare at any one time only

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[3] Prenumbered labels with pressure-sensitive adhesive backs may be obtained from Avery Adhesive Label Corporation, Monrovia, Calif.

[4] A Brewer pipetting machine equipped with Tygon tubing is satisfactory for pipetting trichloroacetic acid.

91	92	93	94	95	96	97	98	99	00
81									90
71									80
61									70
51				55					60
41									50
31									40
21									30
11									20
1	2	3	4	5	6	7	8	9	10

Figure 1. Square cardboard box for holding any block of 100 serially numbered test tubes.

the amount of solution required for one day's operations. This usually involves no more than 15 minutes of the laboratory supervisor's time.

Five percent trichloroacetic acid is prepared from the C. P. reagent and tap water. Inasmuch as the reagent slowly deteriorates at this strength, it is advisable to prepare a fresh supply for each week's work. In large mass survey work, a daily check should be made on the available number of tubes containing trichloroacetic acid in the central supply department. No tube containing trichloroacetic acid should be used in the field more than 2 weeks after its preparation.

Field Sampling

When the individual to be tested arrives at the field station, he is given an identification card and survey form. Both bear the same serial number corresponding to the prenumbered test tubes to be used as identification for all his tests. The survey form lists questions concerning personal history including the time of the last meal or snack.

By means of a Petroff needle, a 4- to 8-cc. sample of blood is collected from each individual and placed in the prenumbered serology tube bearing his serial number. Before a clot can form, a 0.25-cc. portion of the sample is transferred by pipette[5] to the prenumbered blood-sugar test tube containing trichloroacetic acid. The blood-sugar test tubes are then rubber stoppered, mixed well, and shipped to the central sugar-testing laboratory. Refrigeration of the samples, although desirable, is not essential.

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[5] Development of an automatic quantitative transfer device in mass survey work is indicated to reduce the human error factor in rapid pipetting.

Final Analysis in Blood Sugar Laboratory

In the laboratory, the tubes are centrifuged for 5 minutes at approximately 2,500 rpm. The supernatant liquid is decanted as completely as possible from the precipitated proteins into a clean 13- x 100-mm. pyrex test tube. The numbered label is transferred to the new tube at the same time. Exact pipetting of the supernatant is not used, since it has been found that the variation in the volume of supernatant from specimen to specimen is very slight. To this solution, 5 cc. of anthrone reagent is added by means of a Krogh-Keys pipette. The tube is rubber stoppered and immediately inverted several times to insure proper mixing. The technicians performing this operation should wear rubber gloves as a protection against accidental thermal or chemical burns. After they have stood 15 minutes or longer, the same tubes may be read in a spectrophotometer or a photoelectric colorimeter at 620 millimicrons wave length. In our laboratory a Klett-Summerson photoelectric colorimeter with a light filter No. 62 is used. Glucose standards are run with each day's specimens, and with each new batch of anthrone reagent. It has been possible for two technicians to carry out more than 100 such determinations in 1 hour. (If only one test is being done at a time and the standards and reagents have been previously prepared, the entire procedure, from venipuncture to final colorimetric reading, can be performed by one technician in less than 30 minutes.) The readings are recorded on special laboratory forms. (See fig. 2.) In survey routine the exact sugar concentration is not recorded, but all individuals are classified in one of the following groups:

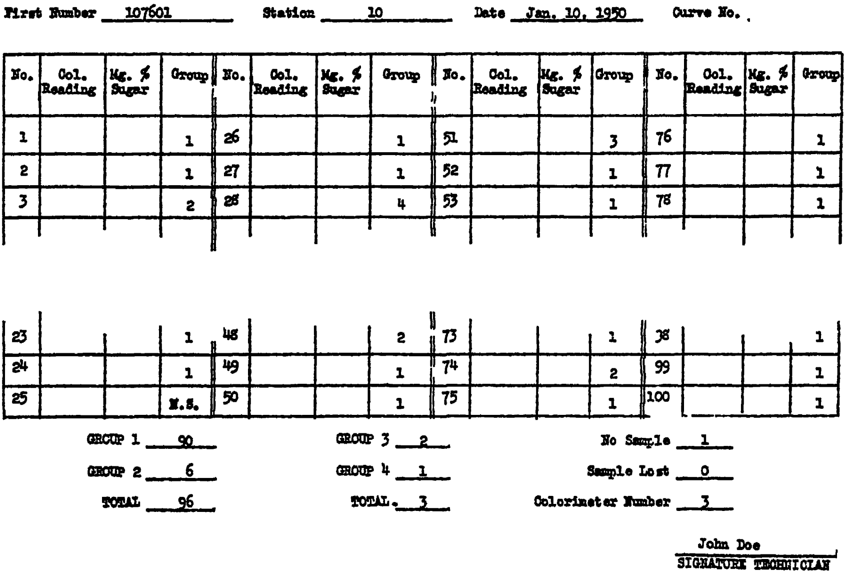
I. Less than 130 mg. percent of blood sugar
II. 130–169 " " " " "
III. 170–199 " " " " "
IV. 200 and over " " " " "

Disposal of Waste Sulfuric Acid

For mass survey operations the disposal of the large amounts of strong sulfuric acid used in this procedure can create quite a problem, especially if it is compulsory to flush the acid down the drain. Neutralization appeared to us to be the method of choice for such work, and for this task we constructed a large lead-lined vat provided with a series of baffles into which the sulfuric acid was dumped. For neutralization purposes the best agent that we have used has been 58 percent light soda ash. An attempt to use crushed limestone for this failed.

Personnel Required and Their Duties

The personnel required and the duties of each for laboratory determinations at the rate of 1,000 per hour are summarized in the flow chart



First Number 107601 Station 10 Date Jan. 10, 1950 Curve No.

No.	Col. Reading	Mg. % Sugar	Group	No.	Col. Reading	Mg. % Sugar	Group	No.	Col. Reading	Mg. % Sugar	Group	No.	Col. Reading	Mg. % Sugar	Group
1			1	26			1	51			3	76			1
2			1	27			1	52			1	77			1
3			2	28			4	53			1	78			1
23			1	48			2	73			1	98			1
24			1	49			1	74			2	99			1
25			N.S.	50			1	75			1	100			1

GROUP 1 90 GROUP 3 2 No Sample 1

GROUP 2 6 GROUP 4 1 Sample Lost 0

TOTAL 96 TOTAL. 3 Colorimeter Number 3

John Doe
SIGNATURE TECHNICIAN

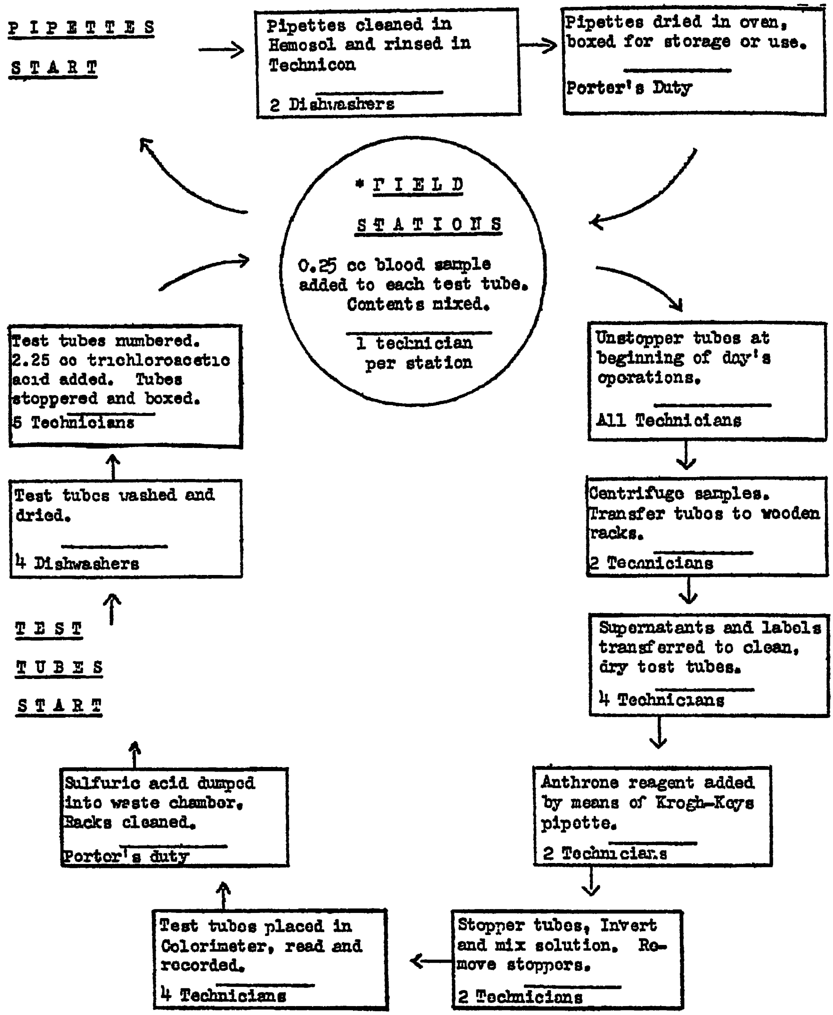
Figure 2. Sample laboratory form for use in a diabetes survey.

(fig. 3). Each operation is indicated together with the number of people required. For operations in which the number of determinations per hour is less than 1,000, the personnel requirements may be reduced proportionately. In smaller scale studies, for instance, it has been found that two technicians and one dishwasher may readily perform 100 complete laboratory analyses per hour. The supervisor, two clerks, and janitor required in large-scale studies (1,000 per hour) are not shown on the flow chart.

Summary and Conclusions

The adaptation of the anthrone blood sugar test for diabetes mellitus to mass case finding survey techniques is described. The procedure is sufficiently simple and rapid to enable three individuals performing venipuncture and one technician pipetting to collect specimens at a rate of more than 100 per hour and to enable two technicians in the laboratory to carry the determinations to completion at the same rate. The anthrone method has the further advantages of being quantitatively accurate for any follow-up diagnostic interpretations and a single test can be easily performed in a small laboratory by one technician in 30 minutes.

Detailed data are given as to the procedure, preparation of glassware, field sampling, final analyses in the laboratory, personnel required, equipment, and reagents needed, and a sample laboratory record form.


PIPETTES
START
Pipettes cleaned in Hemosol and rinsed in Technicon
2 Dishwashers
Pipettes dried in oven, boxed for storage or use.
Porter's Duty
*FIELD
STATIONS
0.25 cc blood sample added to each test tube. Contents mixed.
1 technician per station
Unstopper tubes at beginning of day's operations.
All Technicians
Centrifuge samples. Transfer tubes to wooden racks.
2 Tecnnicians
Supernatants and labels transferred to clean, dry test tubes.
4 Technicians
Anthrone reagent added by means of Krogh-Keys pipette.
2 Technicians
Stopper tubes, Invert and mix solution. Remove stoppers.
2 Technicians
Test tubes placed in Colorimeter, read and recorded.
4 Technicians
Sulfuric acid dumped into waste chamber, Racks cleaned.
Porter's duty
TEST
TUBES
START
Test tubes washed and dried.
4 Dishwashers
Test tubes numbered. 2.25 cc trichloroacetic acid added. Tubes stoppered and boxed.
5 Technicians

* Nurses (or other technicians) to draw the blood at the field station are not shown. Flow Chart of field station procedure for multiphasic health screening surveys may be obtained from the Georgia Department of Public Health, Atlanta 3, Georgia.

Figure 3. Personnel required and the duties of each for laboratory determinations at the rate of 1,000 per hour.

This information is given for handling of 100 and 1,000 blood sugar analyses per hour.

Seven hundred and forty-nine individuals were screened for abnormalities in their sugar metabolism. Follow-up glucose tolerance tests were run on 52 of these individuals and hyperglycemia was found in 20. Simultaneous urine sugar determinations were negative in 10 of the 20.

These findings have persuaded us to abandon the urine sugar test in favor of the anthrone blood sugar test as a mass survey screening procedure.

ACKNOWLEDGMENT

The authors gratefully acknowledge the valuable assistance of Miss Lucy Lester and Mrs. Jeanne Bynum of the laboratory of the Division of Industrial Hygiene, Georgia Department of Public Health, as well as of Dr. E. E. Mandel and the personnel from the Laboratory of Clinical Pathology, Communicable Disease Center, Public Health Service. Much valuable criticism has been provided by Dr. George T. Lewis and the staff at the Biochemistry Department of Emory University, Emory University, Ga.

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(Appendix table follows)

APPENDIX

Equipment and reagents needed for diabetes testing on a mass survey. All items are listed in amounts needed for 7-hour working days in an extended program when the analyses are performed at the rate of 100 and 1,000 per hour.

Item	Amount needed	
	100 detms. per hr.	1,000 detms. per hr.
Equipment:		
Dispensing machine for numbered labels	1	4.
Test tube boxes, cardboard 9" x 9" x 5¾" partitioned (No. 40 chipboard) for 100 test tubes.[1]	18	180.
Pipetting machine for trichloroacetic acid	1	1.
Rubber stoppers for test tubes (size 00 solid)	4,000	40,000.
100-place test tube racks (wooden)	5	50.
Centrifuge (accommodating 128 tubes)	1	2.
Krogh-Keys pipette (for anthrone)	1	4.
Wire baskets, 6" x 6" x 4½", cadmium plated, clamp hinged cover	10	100.
Klett-Summerson colorimeter	1	4.
No. 62 filter for colorimeter	1	4.
Pipette washing machine (Technicon)	1	3.
Technicon baskets (extra)	2	12.
Bucket [2] containing Hemosol solution for dirty pipettes (field station)	2	20.
Emergency stall shower	1	1.
Triple beam balance	1	1.
Analytical balance	1	1.
Needle pan [2]	1	2.
Petroff needles	2,000	20,000.
Tourniquets [2]	3	30.
Forceps [2]	1	2.
Glassware:		
Pipettes,[1] 1 cc. graduated	1,600	16,000.
Test tubes [1]	4,800	48,000.
Micro-burette for glucose standards	1	1.
Volumetric flask for glucose standards	2	2.
Carboy, 5-gallon capacity for anthrone	1	3.
Carboy, 12-gallon capacity for trichloroacetic acid	1	1.
Syphons for carboys	2	4.
Graduated cylinder, 2-liter capacity	1	1.
Beakers, assorted		
Supplies:		
Numbered labels	700	7,000.
Hemosol	¼ lb	1½ lb.
Rubber gloves	6 pairs	6 doz. pairs.
Rubber aprons	3	27.
Data sheets (100 determinations per page)	7	70.
Identification cards	700	7,000.
Cotton balls	700	7,000.
Alcohol		
Reagents:		
Trichloroacetic acid (5 percent)	1,575 cc	15,750 cc.
Anthrone,[3] (0.2 percent in cold 95 percent H_2SO_4 concentration)	3,500 cc	35,000 cc.
Sodium bicarbonate for possible skin burns	1 lb	1 lb.
Glucose	¼ lb	¼ lb.
Benzoic acid	1 lb	1 lb.
Miscellaneous:		
Lead lined bath for disposal of waste sulfuric acid—58 percent light soda ash.	1	1.

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[1] An excess of these items is required since one set is at the field station while another is at the laboratory being prepared for delivery to the field station. A small supply should be available for breakage and any delays in transit.

[2] These items should be distributed among the field stations in proportion to the expected rate at which the blood samples are to be collected. At least one of each of these items should be provided for each field station even if it means an increase in the total number of items.

[3] Because of the present difficulty in obtaining chemically pure anthrone, we made our supply by the method described by D. L. Morris (*15*). However, the production of large quantities is too great an undertaking for the average laboratory and it is suggested that a chemical house be requested to manufacture a reagent grade anthrone.

Toward Better Training and Services in Medical Nutrition

By Charles Glen King*

The science of nutrition has advanced with remarkable rapidity during the last two decades, and the public is intensely aware of the fact that food is an important factor in public health as well as a major item in family budgets.

Agricultural life is increasingly guided by the science of foods and the interrelationship of foods, soil, and health.

Every alert farmer can see the striking effect of mineral elements and organic mulches upon the productivity of his soil. The farmer's family can see with equal clarity the effects of vitamin D, mineral elements, such as iodine, and choice animal proteins, such as milk and meat scrap, upon the growth of farm animals.

No less striking has been the growth of applied nutrition science in the food manufacturing industry and within the chemical industry.

The gains in public health and in an improved national economy that have resulted from these advances can scarcely be challenged. They are too well known.

Neither can the medical profession escape responsibility for leadership in bringing the results of basic research in nutrition to the service of general practice in medicine and in protective measures to conserve public health.

As schools of medicine and public health have increased their teaching and research in biochemistry, physiology, pediatrics, obstetrics, dietetics, nursing, and general measures to protect public health, there has been a natural and substantial need for developing in each institution a division or department in which primary emphasis is placed upon medical nutrition. Further developments of this nature are of urgent importance and should represent opportunities of outstanding attractiveness for young medical scientists. It is axiomatic that such academic posts should be characterized by emphasis upon both basic and clinical research, as well as upon teaching and active participation in professional societies.

Similarly, in schools of agriculture and in the graduate divisions of chemistry and the biological sciences in nearly all of the leading universities, there has been a steady growth in the research and teaching activities pertaining to human and animal nutrition—both from a basic science point of view and in terms of specific training for careers in agriculture, in the food industry, in many related government agencies, and in the manufacture of biological products, such as yeast and antibiotics. Nearly all of the larger food manufacturers now maintain extensive research and development laboratories in which nutrition scientists find attractive opportunities. And in the chemical industry, the manufacture of antibiotics headed the list of pharmaceutical products in 1949, followed by vitamin manufacture as a close second. Recognition of this vigorous trend is shown by the introduction this year of newly organized professional training programs in biochemical engineering at the Massachusetts Institute of Technology and at Columbia University.

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*Scientific Director of the Nutrition Foundation, and Professor of Chemistry, Columbia University.

In 1950, it is already evident that the manufacturers of antibiotics and vitamins have found common ground in the feeding of vitamin supplements and antibiotic concentrates to poultry and livestock. Apparent practical gains in growth and health have resulted in feeding the products to turkeys, chickens, and pigs. It is too early to evaluate the practical significance of such developments, but it is very likely that they will expand fairly rapidly, first in animal feeding, then by diligent efforts to introduce the supplements into the human food supply.

The public generally is intensely interested in the rapid advances demonstrating complex and far-reaching relationships of food practices to health. This response on the part of the public, leaders of industry, government officials, and administrative officers in the universities creates a demand for well-informed medical advice and leadership beyond the range of information generally available from medical specialists in other fields. There is good reason to believe that this trend will continue into the future with increased rather than lessened emphasis.

Throughout the different sections of the United States there is unmistakable evidence that leaders in agriculture, education, industry, and public health see the need for special training of young medical personnel to meet the opportunities and responsibilities that are already at hand. Hence, it is a matter of first-rate importance that in each section of the country there should be well-organized, vigorous programs of training and research in schools of medicine and public health. Such programs are needed not only to provide the training that is desired by medical personnel but also to provide recognized centers as focal points where reliable counsel and advice is available to all of the groups who have a major stake in the production, distribution, and use of foods, in maintaining adequate education of the public, and in the broader aspects of civic administration for the protection of public health.

Until there is adequate leadership on the part of the medical profession, there will be wasteful practices and needless sacrifices of public health, in part, as a result of the public turning to incompetent sources of guidance and, in part, through failure to develop appreciation of the importance of food practices in protecting health and in building a sound over-all economy.

The Department of Agriculture has developed relatively strong and comprehensive programs of research and education, channeled primarily through the State agricultural colleges, experiment stations, and extension services. State and municipal departments of health have also made important contributions to public education, particularly in city areas where the Department of Agriculture has given less emphasis to its program. But these agencies and many industrial and private organizations would gain from having available within each area physicians who are recognized for their leadership and special interest in the field of nutrition. These individuals could exert a strong and stabilizing influence in educational measures by participation in the programs and conferences of many organized groups in their respective areas. Another fruitful channel of public service lies in the opportunity to keep the medical profession itself well informed and interested in food practices that are of primary importance.

The recent appointment of consultants in medical nutrition to the Office of the Surgeon General of the Public Health Service represents an outstanding accomplishment toward developing the kind of leadership that is needed.

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January–June 1950

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For quantities of any of these publications, except the statistical reports of the National Office of Vital Statistics, order from the Government Printing Office, where they are available at the prices shown, with a 25 percent reduction on orders of 100 or more copies of any single publication. The statistical reports of the National Office of Vital Statistics can be obtained only by writing to the National Office of Vital Statistics, Public Health Service, Washington 25, D. C.

PERIODICALS

*Public Health Reports (weekly), January–June, vol. 65, Nos. 1–26, pages 1–850. 10 cents a copy. Subscription price $4 a year.

*Extracts from Public Health Reports (monthly), January–June, Tuberculosis Control Issues Nos. 47–52. Average 30 pages each. 10 cents a copy. Subscription price $1 a year.

*The Journal of Venereal Disease Information (monthly), January–June, vol. 31, Nos. 1–6, pages 1–171. 10 cents a copy. Subscription price 75 cents a year. (Price changed July 1950 to 15 cents a copy; subscription price $1.25 a year.)

*Journal of the National Cancer Institute (bimonthly), February–June, vol. 10, Nos. 4–6, pages 809–1400. $1.50 a copy. Subscription price $8 a year.

Public Health Engineering Abstracts (monthly), January–June, vol. XXX, Nos. 1–6. 32 pages each. No sales stock.

*Industrial Hygiene Newsletter (monthly), January–June, vol. 10, Nos. 1–6. 16 pages each. 10 cents a copy. Subscription price $1 a year.

National Negro Health News (quarterly), January–March; April–June, vol. 18, Nos. 1 and 2. 28 and 24 pages. No sales stock.

CDC Bulletin (monthly), January–June, vol. IX, Nos. 1 to 6. No sales stock.

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*Subscriptions to this periodical can be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

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2997. Eight new *Salmonella* types. By James Watt, Thelma DeCapito, P. R. Edwards, G. J. Hermann, and Alice B. Moran. February 17, 1950. 9 pages. 5 cents.

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390. Procaine penicillin G in the treatment of gonorrhea. By Ralph B. Hogan, Edgar B. Johnwick, Leland J. Hanchett, Fred W. Harb, and Ottis L. Adar. April 1950. 10 pages. 5 cents.
391. Uniformity of Kahn antigen. Mutually established criteria for an acceptable antigen and the use of a reference antigen by the Michigan Department of Health laboratories and the serology laboratory of the University of Michigan Hospital. By Pearl L. Kendrick and Reuben L. Kahn. April 1950. 4 pages. 5 cents.
392. Report on the venereal disease control cost analysis, fiscal year 1948. By Archibald B. Clark and Benjamin E. Carroll. April 1950. 8 pages. 5 cents.
393 Reports of the North Carolina syphilis studies. IV. Some problems in the evaluation of venereal disease education. By John J. Wright, Cecil G. Sheps, and Alice E. Gifford. May 1950. 9 pages. 5 cents.
394. The false-positive reaction in serology of syphilis: The presence of an anti-acetone soluble substance in human serum. By Daniel Widelock, Mary F. Gonshorek, and Lillian Marsden. May 1950. 4 pages. 5 cents.
395. Education and mass blood testing an effective syphilis case-finding combination. By A. L. Gray. May 1950. 5 pages. 5 cents.
396. Mass screen testing. By E. M. Holmes, Jr., Paul W. Bowden, and James H. Stone. June 1950. 5 pages 5 cents.

397. Crystalline penicillin G versus amorphous penicillin: Treatment of early syphilis. By George X. Schwemlein, Frederick Plotke, and Jack Rodriquez. June 1950. 4 pages. 5 cents.

398. Adaptation of the VDRL method for total protein determination to the use of small quantities of cerebrospinal fluid. By Rudolph K. Waldman, Lorraine F. Ullrich, and Earle K. Borman. June 1950. 4 pages. 5 cents.

VENEREAL DISEASE FOLDERS

1. Cause, spread, and cure of syphilis. 1950 revision. 6-page folder. 5 cents; $1.75 per 100.

3. Protecting the unborn baby. 1950 revision. 4-page folder. 5 cents; $1.75 per 100.

4. Wedding plans, physical examination, blood test. 1950 revision. 6-page folder. 5 cents; $1.75 per 100.

5. Cause, spread, and cure of gonorrhea. 1950 revision. 6-page folder. 5 cents; $1.75 per 100.

REPRINTS FROM JOURNAL OF THE NATIONAL CANCER INSTITUTE*

200. The biotherapeutic action of *Trypanosoma cruzi* on tar carcinoma in mice. By G. C. Jedeloo, G. O. E. Lignac, A. J. Ligtenberg, and P. H. van Thiel. February 1950. 5 pages.

201. Inhibition of mammary-gland development and mammary-tumor formation in female C3H mice following ingestion of thiouracil. By Celia S. Dubnik, Harold P. Morris, and Albert J. Dalton. February 1950. 26 pages: 9 plates.

202. Effect of ultrasonic vibration on the formed elements of blood from normal and leukemic subjects. By Patrice L. Morrow, Howard R. Bierman, and Robert Jenkins. February 1950. 16 pages; 3 plates.

203. Mammary tumor-agent in the sperm of high-cancer-strain male mice. By O. Muhlbock. February 1950. 5 pages.

204. Production of malignancy *in vitro*. IX. Description of cells at the fluid interface of the culture. By Wilton R. Earle, Edward L. Schilling, and Emma Shelton. February 1950. 16 pages; 5 plates.

205. Use of perforated cellophane substrate in slide preparation tissue cultures. By Edward L. Schilling, Wilton R. Earle, and Virginia J. Evans. February 1950. 8 pages; 2 plates.

206. Note on the lack of progressive growth of metastatic mammary carcinoma transplanted subcutaneously into foreign strains of mice. By Richmond T. Prehn. February 1950. 2 pages.

207. Response of mammary-tumor-agent-free strain DBA female mice to percutaneous application of methylcholanthrene. By Howard B. Andervont and Thelma B. Dunn. February 1950. 31 pages; 4 plates.

208. Induction of hemangio-endotheliomas and sarcomas in mice with *o*-aminoazotoluene. By Howard B. Andervont. February 1950. 15 pages.

209. Extension of cellophane substrate procedure to growth of *in vitro* cultures of large areas. By Wilton R. Earle, Virginia J. Evans, and Edward L. Schilling. February 1950. 25 pages; 9 plates.

210. Intracellular distribution of enzymes. VI. The distribution of succinoxidase and cytochrome oxidase activities in normal mouse liver and in mouse hepatoma. By Walter C. Schneider and George H. Hogeboom. February 1950. 7 pages.

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*No sales stock is carried on any of the reprints from the Journal of the National Cancer Institute.

211. Intracellular distribution of enzymes. VII. The distribution of nucleic acids and adenosinetriphosphatase in normal mouse liver and mouse hepatoma. By Walter C. Schneider, George H. Hogeboom, and Helen E. Ross. February 1950. 6 pages.

212. Intracellular distribution of enzymes. VIII. The distribution of diphosphopyridine nucleotide-cytochrome C reductase in normal mouse liver and mouse hepatoma. By George H. Hogeboom and Walter C. Schneider. February 1950. 5 pages.

213. Observations on inbred mice exposed to DDT. By B. E. Bennison and F. K. Mostofi. February 1950. 4 pages.

214. Mucolytic enzyme systems. XII. Hyaluronidase in human and animal tumors, and further studies on the serum hyaluronidase inhibitor in human cancer. By Lawrence B. Kiriluk, Arnold J. Kremen, and David Glick. February 1950. 8 pages.

NATIONAL OFFICE OF VITAL STATISTICS PUBLICATIONS*

Current Mortality Analysis (monthly), vol. 7, Nos. 9–12, 1949; vol. 8, Nos. 1–3, 1950.

Monthly Marriage Report (marriage licenses issued in major cities), vol. 3, Nos. 11–13, 1949; vol. 4, Nos. 1–4, 1950.

Monthly Vital Statistics Bulletin, vol. 12, Nos. 11–13, 1949; vol. 13, Nos. 1–4, 1950.

Weekly Mortality Index, vol. 20, Nos. 52–53, 1949; vol. 21, Nos. 1–25, 1950.

Weekly Morbidity Report, vol. 1, Nos. 1–24, 1950.

Communicable Disease Summary, weeks ending Jan. 7–June 17, 1950.

VITAL STATISTICS—SPECIAL REPORTS, VOL. 33, SELECTED STUDIES

No. 4. Generation Reproduction Rates. 63–68 pages.

No. 5. Illegitimate Births, 1938–1947. 69–106 pages.

No. 6. Registration of Vital Events Among Indians. 107–126 pages.

VITAL STATISTICS—SPECIAL REPORTS, VOL. 34, STATE SUMMARIES

Nos. 1–29, Alabama–New Jersey. 1–522 pages.

VITAL STATISTICS—SPECIAL REPORTS, VOL. 35, NATIONAL SUMMARIES

No. 2. Births by Race and by Urban and Rural Areas: United States, each Division and State, 1948. 11–18 pages.

No. 3. Marriages: United States, each State and county, 1948. 19–42 pages.

No. 4. Summary of Mortality Statistics: United States, 1948. 43–50 pages.

No. 5. Deaths by Urban and Rural Areas and by Race: United States, each Division and State, 1948. 51–58 pages.

No. 6. Deaths and Death Rates for Selected Causes: United States, each Division and State, 1948. 59–74 pages.

No. 7. Births by Person in Attendance: United States, each Division and State, 1948. 75–88 pages.

No. 8. Deaths from Selected Causes for 92 Major Cities in the United States, 1948. 89–106 pages.

No. 9. Marriage Statistics: Specified States, 1948. 107–128 pages.

No. 10. Births by Age of Mother, Race and Birth Order, United States, 1948. 129–144 pages.

No. 11. Deaths and Crude Death Rates for Each Cause: United States, 1946–1948. 145–160 pages.

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*Available only from the National Office of Vital Statistics, Public Health Service, Washington 25, D. C.

Incidence of Disease

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

Reports from States for Week Ended December 2, 1950

Measles. For the current week 2,515 cases of measles were reported as compared with 2,026 cases for the previous week. The total number reported since the season low point (September 2) is 15,243 as compared with 10,561 for the corresponding period in 1949.

Tularemia. There were 23 cases of tularemia reported for the current week compared with an average of 9 for the 4 previous weeks.

Other Diseases. Four cases of smallpox, 1 in Ohio and 3 in Kentucky, were reported for the current week. There were 1,931 cases of whooping cough reported for the current week compared with 1,640 for the previous week. A slight increase in the number of poliomyelitis cases was reported, 598 for the current week. The total number for the "disease" year is 30,858 as compared with 40,529 for the same period last year.

Comparative Data For Cases of Specified Reportable Diseases: United States

[Numbers after diseases are International List numbers, 1948 revision]

Disease	Total for week ended—		5-year median 1945–49	Seasonal low week	Cumulative total since seasonal low week		5-year median 1944–45 through 1948–49	Cumulative total for calendar year		5-year median 1945–49
	Dec 2, 1950	Dec 3, 1949			1949–50	1948–49		1950	1949	
Anthrax (062)	-------	4	(1)	(1)	(1)	(1)	(1)	42	51	(1)
Diphtheria (055)	145	211	315	27th	2,441	3,620	4,923	5,509	7,388	11,220
Acute infectious encephalitis (082)	18	4	5	(1)	(1)	(1)	(1)	933	720	597
Influenza (480–483)	2,560	2,142	2,492	30th	24,903	20,626	22,190	271,252	96,493	164,725
Measles (085)	2,515	1,619	2,277	35th	[2] 15,243	10,561	14,873	[2] 303,414	599,079	578,346
Meningococcal meningitis (057.0)	60	79	79	37th	661	653	653	3,460	3,169	3,184
Pneumonia (490–493)	1,443	1,599	-------	(1)	(1)	(1)	(1)	[2] 74,697	71,467	-------
Acute poliomyelitis (080)	598	433	261	11th	[3] 30,858	40,529	24,055	[3] 31,989	41,442	24,522
Rocky Mountain spotted fever (104)	-------	-------	-------	(1)	(1)	(1)	(1)	451	558	555
Scarlet fever (050)	1,158	1,340	1,730	32d	10,479	11,389	14,763	50,649	69,055	76,164
Smallpox (084)	4	1	1	35th	11	6	9	37	47	156
Tularemia (059)	23	15	26	(1)	(1)	(1)	(1)	825	1,018	899
Typhoid and paratyphoid fever (040, 041) [4]	51	48	53	11th	2,745	3,198	3,198	3,254	3,686	3,686
Whooping cough (056)	1,931	2,026	2,026	39th	14,997	14,727	15,628	112,192	61,329	91,503

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[1] Not computed.

[2] Additions: West Virginia, week ended November 25, measles, 28 cases and pneumonia, 3.

[3] Addition: Iowa, delayed report, 32 cases. Deduction, Michigan, week ended September 16, 1 case.

[4] Including cases reported as salmonellosis.

Reports of Epidemics

Food-borne gastro-enteritis. Dr. A. L. Gray, State Board of Health, has reported an outbreak of acute gastro-enteritis in Mississippi, which occurred in a city with a population of 40,000. There were 18 cases with onset of illness between September 16 and 25, inclusive. The illness was characterized by sudden onset with nausea, vomiting, abdominal pain, and diarrhea lasting for a period of from 6 to 28 hours. The incubation period ranged from 6½ to 30 hours (median 19 hours). Investigation revealed that a cream-filled pastry was the vehicle of transmission. Although the outbreak was first regarded as food poisoning from staphylococcus contamination which originated from lesions on a baker's hands, further studies suggested that the causative agent was a member of the enteric group of organisms. However, no specimens of food were available for bacteriological examination.

Trichinosis. Dr. W. R. Geidt, Washington State Department of Health, has reported an outbreak of trichinosis consisting of 13 cases in Seattle. The vehicle of infection was thought to be sausage made late in October from hogs shipped from West North Central States. The onset of cases was early in November. Diagnosis was confirmed clinically and by muscle biopsy in one case. The routine processing of meat was considered to be satisfactory.

Keratoconjunctivitis. A follow-up report by Dr. Saxvik, State Health Officer, on 89 cases of keratoconjunctivitis in Minot, N. Dak., indicates that the first confirmed case occurred on October 9, 1950. The primary outbreak occurred among school children, but numerous cases were seen also in farmers and businessmen.

Deaths During Week Ended December 2, 1950

	Week ended Dec. 2, 1950	*Corresponding week, 1949*
Data for 93 large cities of the United States:		
Total deaths	10, 105	9, 892
Median for 3 prior years	9, 892	
Total deaths, first 48 weeks of year	438, 034	438, 577
Deaths under 1 year of age	698	682
Median for 3 prior years	704	
Deaths under 1 year of age, first 48 weeks of year	29, 886	31, 294
Data from industrial insurance companies:		
Policies in force	69, 647, 352	70, 006, 580
Number of death claims	10, 972	14, 082
Death claims per 1,000 policies in force, annual rate	8. 2	10. 5
Death claims per 1,000 policies, first 48 weeks of year, annual rate	9. 2	9. 1

Reported Cases of Selected Communicable Diseases: United States, Week Ended December 2, 1950

[Numbers under diseases are International List numbers, 1948 revision]

Area	Diphtheria (055)	Encephalitis, infectious (082)	Influenza (480–483)	Measles (085)	Meningitis meningococcal (057.0)	Pneumonia (490–493)	Poliomyelitis (080)
United States	**145**	**18**	**2,560**	**2,515**	**60**	**1,443**	**598**
New England	**4**	**2**		**58**	**3**	**40**	**15**
Maine				11		6	1
New Hampshire					1		1
Vermont				3			
Massachusetts	4	1		36	1		5
Rhode Island				3			
Connecticut		1		5	1	34	8
Middle Atlantic	**11**	**4**	**6**	**535**	**8**	**376**	**121**
New York	9	4	[1]1	156	5	268	80
New Jersey			5	113		53	14
Pennsylvania	2			266	3	55	27
East North Central	**7**	**3**	**51**	**710**	**15**	**96**	**121**
Ohio	1		3	178	4		26
Indiana	1	2		18		17	10
Illinois	4		1	174	7	53	25
Michigan		1		112	2	21	41
Wisconsin	1		47	228	2	5	19
West North Central	**9**	**1**	**3**	**139**	**7**	**133**	**40**
Minnesota	6	1		21	2	6	10
Iowa	1			5	1	1	9
Missouri	1		1	97	1	11	4
North Dakota			2	10		93	
South Dakota						3	4
Nebraska					2		7
Kansas	1			6	1	19	6
South Atlantic	**49**	**2**	**334**	**169**	**9**	**265**	**88**
Delaware				3			
Maryland			1	4		26	9
District of Columbia				6		14	
Virginia	5		195	18	1	54	17
West Virginia	13		80	33	3	12	6
North Carolina	10			45	3		8
South Carolina	2		26	3	1	9	3
Georgia	18	1	31	53	1	134	24
Florida	1	1	1	4		16	21
East South Central	**31**		**53**	**55**	**3**	**76**	**25**
Kentucky	10		4	13		7	18
Tennessee	11		21	23	2		1
Alabama	5		25	3	1	53	3
Mississippi	5		3	16		16	3
West South Central	**26**	**1**	**1,893**	**166**	**5**	**331**	**48**
Arkansas	4	1	114	23	1	34	9
Louisiana	1			1	1	14	2
Oklahoma	1		67	20	2	13	7
Texas	20		1,712	122	1	270	30
Mountain	**3**	**1**	**205**	**253**	**1**	**82**	**21**
Montana			13	9		1	1
Idaho			12	42	1	10	2
Wyoming	1			4		3	1
Colorado		1	41	174		23	2
New Mexico	1		2	6		24	6
Arizona	1		137	9		20	6
Utah				7		1	3
Nevada				2			
Pacific	**5**	**4**	**15**	**430**	**9**	**44**	**119**
Washington			1	181	1	2	20
Oregon	1		9	18		7	19
California	4	4	5	231	8	35	80
Alaska			3			3	1
Hawaii	1		30		1		

[1] New York City only.

Reported Cases of Selected Communicable Diseases: United States, Week Ended December 2, 1950—Continued

[Numbers under diseases are International List numbers, 1948 revision]

Area	Rocky Mountain spotted fever (104)	Scarlet fever (050)	Smallpox (084)	Tularemia (059)	Typhoid and paratyphoid fever[1] (040,041)	Whooping cough (056)	Rabies in animals
United States		**1,158**	**4**	**23**	**51**	**1,831**	**102**
New England		**119**			**1**	**311**	
Maine		20				17	
New Hampshire		7				4	
Vermont		5				65	
Massachusetts		78				107	
Rhode Island		2				62	
Connecticut		7			1	56	
Middle Atlantic		**166**		**5**	**5**	**399**	**15**
New York		[2] 89			4	197	13
New Jersey		20		1		119	
Pennsylvania		57		4	1	83	2
East North Central		**261**	**1**	**8**	**3**	**350**	**13**
Ohio		80	1		1	57	7
Indiana		28		3	1	50	
Illinois		49		5	1	44	
Michigan		84				95	6
Wisconsin		20				104	
West North Central		**72**			**1**	**134**	**11**
Minnesota		16				21	2
Iowa		18				5	7
Missouri		10			1	12	1
North Dakota		7				19	
South Dakota						1	
Nebraska		11				30	
Kansas		10				46	1
South Atlantic		**142**		**2**	**11**	**181**	**16**
Delaware		2				8	
Maryland		6			4	34	
District of Columbia		11				10	
Virginia		17		1	1	39	1
West Virginia		17		1	2	28	1
North Carolina		51				25	
South Carolina		7				2	8
Georgia		24			4	25	6
Florida		7				10	
East South Central		**96**	**3**	**2**	**2**	**75**	**17**
Kentucky		34	3			5	10
Tennessee		35			1	19	2
Alabama		22				41	5
Mississippi		5		2	1	10	
West South Central		**55**		**5**	**10**	**221**	**30**
Arkansas		5		3	1	31	4
Louisiana		5		1	2	1	
Oklahoma		11				6	
Texas		34		1	7	183	26
Mountain		**66**		**1**	**7**	**147**	
Montana		16		1		32	
Idaho		5			3		
Wyoming						2	
Colorado		15				21	
New Mexico		4			4	39	
Arizona		8				48	
Utah		18				5	
Nevada							
Pacific		**181**			**11**	**113**	
Washington		59			1	47	
Oregon		14				12	
California		108			10	54	
Alaska						6	
Hawaii		3					

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[1] Including cases reported as salmonellosis.

[2] Including cases reported as streptococcal sore throat.

FOREIGN REPORTS

CANADA

Reported Cases of Certain Diseases—Week Ended November 18, 1950

Disease	New-foundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Brucellosis	-------	-------	-------	-------	4	1	-------	-------	-------	-------	5
Chickenpox	2	-------	80	2	295	498	57	159	120	80	1,293
Diphtheria	-------	-------	-------	1	2	-------	-------	-------	-------	3	6
Dysentery, bacillary	-------	-------	-------	-------	11	6	1	-------	-------	6	24
German measles	-------	-------	5	4	11	58	-------	10	23	27	138
Influenza	-------	-------	5	-------	-------	4	1	-------	-------	4	14
Measles	6	-------	1	-------	455	680	40	33	31	69	1,315
Meningitis, meningococcal	-------	-------	-------	-------	-------	2	-------	-------	-------	-------	2
Mumps	1	-------	14	-------	115	294	18	70	173	149	834
Poliomyelitis	-------	-------	-------	1	-------	2	-------	2	2	-------	7
Scarlet fever	4	-------	2	-------	79	81	10	15	53	111	355
Tuberculosis (all forms)	10	-------	9	8	124	32	13	10	12	32	250
Typhoid and paratyphoid fever	-------	-------	-------	2	15	2	-------	-------	-------	4	23
Venereal diseases:											
Gonorrhea	3	-------	5	5	85	50	21	17	47	84	317
Syphilis	2	-------	6	3	69	21	2	18	1	9	131
Primary	-------	-------	-------	-------	4	4	-------	5	1	-------	14
Secondary	-------	-------	1	-------	3	1	-------	2	-------	-------	7
Other	2	-------	5	3	62	16	2	11	-------	9	110
Other forms	-------	-------	-------	-------	-------	-------	-------	-------	-------	1	1
Whooping cough	3	-------	3	5	146	186	20	-------	4	14	381

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

The following reports include only items of unusual incidence or special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently. A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

Burma. During the week ended November 11, 1950, 54 cases (30 deaths) of cholera were reported in Burma. For the week ended November 4, 11 cases were reported.

India (French). For the week ended November 11, 1950, 7 cases (6 deaths) of cholera were reported in Karikal as compared with 14 (3 deaths) for the previous week.

Smallpox

Burma. During the week ended November 18, 1950, one case of smallpox was reported in Moulmein.

India. For the week ended November 25, 1950, 99 cases of smallpox were reported in Calcutta. There were 15 cases reported in Madras for this week. For the week ended November 18, Calcutta and Madras reported 64 and 35 cases, respectively.

India (French). Smallpox was reported in Pondicherry as follows: Week ended November 11, 1950, 31 cases (15 deaths) and week ended November 4, 32 cases (16 deaths).

Morocco (French). One case of smallpox was reported for the period November 1–10, 1950. This is the first case since the period August 1–10 when one case was reported.

Nigeria. During the week ended October 21, 1950, 261 cases (43 deaths) of smallpox were reported. For this week one and five cases were reported in Calabar and Lagos, respectively.

Japan. A vessel (S. S. Dai Ichi Kaiko Maru) traveling from Pusan and Moji arrived at Nagasaki during the week ended October 28, 1950 with a case of smallpox. The date of onset of the disease was October 20.

Typhus Fever

Ethiopia. During the week ended September 18, 1950, 32 cases of typhus fever were reported. Reports for the week ended September 4 and 11 show 62 and 60 cases, respectively.

India. For the week ended October 28, 1950, 9 cases (4 deaths) of typhus fever were reported in Jammu and Kashmir State.

Turkey. During the week ended November 25, 1950, seven cases of typhus fever were reported in Turkey as compared with six for the previous week. One case has been reported each week in Istanbul since the middle of September.

Training Course in Radiological Health

The University of Michigan School of Public Health is offering an inservice training course in Radiological Health to be held February 5–8, 1951, at Ann Arbor. It is one of a series of "continued" education courses and is noncredit.

Given at the request of the Michigan Health Officers Association, the course is planned by a committee of thirteen including H. E. Miller, Director, and Henry F. Vaughan, Dean, of the School of Public Health, and assisted by the Atomic Energy Commission, the Michigan Office of Civilian Defense, and the U. S. Public Health Service.

Four sections are planned: 1. Orientation; 2. Ways Ionizing Radiations Are Used; 3. Biological and Medical Effects; and 4. Public Health Implications.

Although not a course in civilian defense, it will provide public health workers with information that should aid them in more readily understanding some of the problems in which they might some time receive civilian defense training.

The course is set up for public health workers in Michigan, but interested persons elsewhere are welcome. It is suggested that persons planning to attend make early reservation as applicants will be enrolled to the extent of seating space. The fee is $5. For further information and enrollment applications address H. E. Miller, School of Public Health, University of Michigan, Ann Arbor, Mich.

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The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, Public Health Service, Washington 25, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington 25, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

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Public Health Reports

VOLUME 65 **DECEMBER 29, 1950** NUMBER 52

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Causes of Absenteeism in New Haven Schools
Communicable Diseases, Third Quarter, 1950

1798

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
G. St. J. Perrott, Chief of Division

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World distribution:

- Cholera........ 1759
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- Smallpox........ 1760
- Typhus fever........ 1762
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Causes of Absenteeism in New Haven Schools

—Follow-up After 21 Years—

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A reevaluation of the causes of absenteeism in New Haven schools during the 1948–49 school year revealed 66.3 absences per 100 pupils per school year as compared with 48.6 in 1927–28, an increase of 17.7 absences per 100 school children under observation. This increase was disclosed in a continuing study of absenteeism of three or more consecutive school days in the New Haven public and parochial school population. The 1948–49 study is a follow-up of an investigation by Wilson and his co-workers for 1927–28 (*1*).

The classification of causes of absence and the methods of tabulation utilized in 1927–28 were employed in the present study. The causes of absenteeism recorded in the earlier investigation represented the considered opinion of the school nurse or physician; their conclusions were based upon home visits by school nurses, physicians or health department epidemiologists, as well as information from family physicians, parents, or, frequently, the children themselves. Information given by the school child stems, on the whole, from the parent or family physician. During 1948–49, the bulk of data was obtained directly from physicians or parents. A factor affecting the number of cases in both studies was some variation in enforcement of the ruling that children absent three or more school days must be seen by the school nurse or doctor. Probably a minimum of 95 percent of all absences were recorded in both 1927–28 and 1948–49.

Further differences were noted. First, no cases of German measles were tabulated in the earlier investigation. Information in this office revealed that the school year 1927–28 was a period of low morbidity, and the cases that occurred in school children were placed in the miscellaneous sickness category. Second, the few school children absent in 1927–28 because of two consecutive diseases were catalogued by each cause, and the number of days absent were allocated proportionally (*2*). Third, public school children constituted the only population observed in the earlier study, while parochial school children were included in the present investigation. Lastly, a difference in criterion of total days absent was utilized in 1948–49. In both studies, readmission to school after absence of three or more consecutive school days required an admission slip signed by the school physician or nurse. Pertinent information was obtained at that time. In 1927–28, however, the duration of absence was computed by subtracting the date of the first day of absence from the date of the pupil's return to school. Saturdays, Sundays, and short legal holidays [1] were therefore included in the duration when the pupil was absent on the day preceding the week end or holiday. In 1948–49, on the other hand, absences on nonschool days were omitted.

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All the differences except the last described are not significant; the last discrepancy necessitates statistical compensation. The utilization of school days only in 1948–49 was required by other concomitant investigations. The discrepancy can be overcome if 1 day is added to each 2.5 days of absence in 1948–49; or 1 day is subtracted from each 3.5 days in 1927–28. Thus, 2 days are added to each 5 days' absence in 1948–49, which closely approximates the calendar week utilized in 1927–28. Six additional days of absence because of short holidays in 1927–28 are not considered because they do not materially affect the calculations. This correction assumes that the frequency of absences beginning on each day of the week was the same as the average. Actually, both studies found that some parents

Table 1. *Number of cases of absenteeism and cases of absenteeism per 100 pupils, by age, New Haven, 1948–49*

Age (years)	School population	Pupil days per school year	Cases of absenteeism	Cases per 100 pupils
5 and under	3 214	587,520	2.693	83.8
6	2,422	435,960	2,959	122.2
7	2,088	375,840	1,936	92.7
8	1.878	338,040	1,504	80.1
9	1,859	334,620	1,193	64.2
10	1,955	351,900	1,113	56.9
11	1,848	332,640	878	47.5
12	1,822	327,960	782	42.9
13	1,899	341,820	682	35.9
14	1,736	312.480	770	44.4
15	1,494	268,920	861	57.6
16	1,321	237,780	780	59.0
17	1,181	212,580	598	50.6
18	687	123,660	205	29.8
19 and over	202	36,360	24	11.9
Total	25,606	4,609,080	16,978	66.3

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[1] Excluding Christmas and Easter vacation.

tended to keep children out of school over the week end even though the children were well enough to return to school on Friday.

Data collected for the 1948–49 study show there were 16,978 absences of 3 or more consecutive school days, or a rate of 66.3 absences per 100 school children during the school year (table 1). These figures compare with 16,382 absenteeism cases, or a rate of 48.6 absences per 100 school children during the school year in 1927–28. In 1948–49, there were 25,606 school children, 180 school days, and 4,609,080 pupil days; in 1927–28, there were 33,700 public school children, 186 school days, and 6,268,200 pupil days. High school children are included in both studies.

The causes of absence are listed in tables 2, 3, and 6. The first three divisions constitute the respiratory infections and warrant further clarification:

1. Colds include grippe, influenza, and virus infection of less than 7 days' duration.
2. Diseases of throat and tonsils include "sorethroat," laryngitis, croup, and tonsil and adenoid operations.
3. Other respiratory diseases include tracheitis, bronchitis, sinusitis, tuberculosis, and pneumonia, and also grippe, influenza, and other virus infections of more than 6 days' duration.

The other divisions are self-explanatory except that scarlet fever includes beta-hemolytic streptococcal nose and throat infections.

Table 2. *Number of cases and days of sickness, by cause of sickness, New Haven, 1927–28 and 1948–49*

Cause of sickness	Number of cases		Number of days of sickness	
	1927	1948	1927	1948
Colds	5,783	7,347	51,636	36,713
Diseases of throat and tonsils	1,956	2,168	17,618	12,781
Other respiratory diseases	566	997	13,415	8,911
Diphtheria	114	0	2,492	0
Chickenpox	340	733	5,905	6,663
Measles	1,570	1,823	32,683	20,173
German measles	(1)	171	(1)	1,033
Mumps	1,723	520	25.551	4,527
Whooping cough	519	23	25,589	519
Scarlet fever	43	222	1,363	2.576
Two communicable diseases, consecutive	(2)	78	(2)	1.358
Diseases and disorders of the eye	159	185	1,343	989
Earache and ear disease	276	404	3,943	2,696
Toothache and disease of teeth	204	167	1,644	884
Digestive disease and disorder	446	462	5,697	2,670
Skin disease	248	411	3,436	2,824
Accidents, injuries and abrasions	386	196	5,271	1,451
Miscellaneous other sickness	1,135	856	14,490	6,214
All sickness	15,468	16,763	212,076	112,982
All respiratory sickness	8,305	10,512	82,669	58,405
All specific communicable diseases of childhood	4,309	3,570	93,583	36,849
All other causes of sickness	2.854	2.681	35,824	17,728
Nonsickness	914	215	12,501	1.552
All absences	16,382	16,978	224,577	114,534

[1] Included in miscellaneous other sickness in 1927–28.
[2] Allocated separately to each cause in 1927–28.

Table 3. *Absences due to various causes of illness and to causes other than illness among school children of New Haven*

Causes of absence	Absences during year per 100,000 pupil days		Percentage change in absence rates, 1927 to 1948	Days lost from school during year per 100,000 pupil days [1]		Percentage change in rate for days lost, 1927 to 1948	Days lost from school per case [1]		Percentage change in days per case, 1927 to 1948
	1927	1948		1927	1948		1927	1948	
Colds	92.26	159.40	+72.8	823.8	1,115.1	+35.4	8.9	7.0	−21.3
Diseases of throat and tonsils	31.21	47.04	+50.7	281.1	388.2	+38.1	9.0	8.3	−7.8
Other respiratory diseases	9.03	21.63	+139.5	214.0	270.6	+26.4	23.7	12.5	−47.3
Diphtheria	1.82	--------	--------	39.8	--------	--------	21.9	--------	--------
Chickenpox	5.42	15.90	+193.4	94.2	202.4	+114.9	17.4	12.7	−27.0
Measles	25.05	39.55	+57.9	521.4	612.8	+17.5	20.8	15.5	−25.5
German measles	(2)	3.71	--------	(2)	31.4	--------	(2)	8.4	--------
Mumps	27.49	11.28	−59.0	407.6	137.5	−66.3	14.8	12.2	−17.6
Whooping cough	8.28	.50	−94.0	408.2	15.8	−96.1	49.3	31.6	−35.9
Scarlet fever	.69	4.82	+598.6	21.7	78.3	+260.8	31.7	16.2	−48.9
Two communicable diseases, consecutive	(3)	1.69	--------	(3)	41.3	--------	(3)	24.4	--------
Diseases and disorders of the eye	2.54	4.01	+57.9	21.4	30.1	+40.7	8.4	7.4	−11.9
Earache and ear disease	4.40	8.77	+99.3	62.9	81.9	+30.2	14.3	9.4	−34.3
Toothache and disease of teeth	3.25	3.62	+11.4	26.2	26.8	+2.3	8.1	7.4	−8.6
Digestive diseases and disorders	7.12	10.02	+40.7	90.9	81.1	−10.8	12.8	8.1	−36.7
Skin diseases	3.96	8.92	+125.3	54.8	85.8	+56.6	13.9	9.7	−30.2
Accidents, injuries, and abrasions	6.16	4.25	−31.0	84.1	44.1	−47.6	13.7	10.4	−24.1
Miscellaneous other sickness	18.11	18.57	+2.5	231.2	188.7	−18.4	12.8	10.2	−20.3
All sickness	246.77	363.70	+47.4	3,383.4	3,431.8	+1.4	13.7	9.4	−31.4
All respiratory sickness	132.49	228.07	+72.1	1,318.9	1,774.1	+34.5	10.0	7.8	−22.0
All specific communicable diseases	68.74	77.46	+12.7	1,493.0	1,119.3	−25.0	21.7	14.4	−33.6
All other causes of sickness	45.53	58.17	+27.8	571.5	538.4	−5.8	12.6	9.2	−27.0
Nonsickness	14.58	4.66	−68.0	199.4	47.2	−76.3	13.7	10.1	−26.3
All absences	261.35	368.36	+40.9	3,582.8	3,479.0	−2.9	13.7	9.4	−31.4

[1] Days in 1948 study corrected to a 7-day week basis to agree with 1927 study.
[2] Included in miscellaneous other sickness in 1927–28.
[3] Allocated separately to each cause in 1927–28.

Table 2 presents the raw data, numbers of cases, and total days of absence by cause of absenteeism.

Table 3 shows for both study periods the absences and days lost by cause of absenteeism per 100,000 pupil days based on the total child population during the entire period of risk, as well as the days lost from school per case. Two significant changes occurred—illness increased from 246.6 in 1927–28 to 363.7 cases per 100,000 pupil days in 1948–49, and the incidence of respiratory diseases increased from 132.3 to 228.1. Since rates for the childhood communicable diseases are dependent upon epidemicity, comparisons of case rates for 1 year with another are not valid. Significant increases in both absences and days lost per 100,000 pupil days occurred in most disease categories, but the respiratory disease group showed the greatest increase. Remembering the difference in criteria of absence in 1927–28 and in 1948–49, the days lost from school per case may be compared if the adjustment mentioned is utilized. A significant decrease in days lost from school per case for every category becomes evident. These results are comparable to the findings of Ciocco, Cameron and Bell (*3*) in their evaluation of the 1921–25, 1935–36, and 1939–40 studies on absenteeism in Hagerstown, Md., schools. The case rates per

1,000 children per school year for all causes of absence increased for each succeeding study period; and the average number of days absent per case of sickness decreased.

Table 4 presents the average duration per case by age groups for all sickness and for all sickness categories minus the childhood communicable diseases. This tabulation shows the longer duration of illness in the younger age groups in both study periods, as well as the greatest decrease in average duration in age groups 5 through 9. This trend was also noted in the Hagerstown evaluation (*3*).

Table 5 presents the important and not wholly unexpected finding that the case rates of sickness by age per 100,000 pupil days for 1948–49 show a progressive increase over the 1927–28 observations. The rates for 1948–49 are approximately double those for 1927–28 at ages 10 and older. The major factors for this change may be the shift of previously predominant preschool communicable diseases to the school age group (*4*, *5*), the decreasing size of the American family (*6*, *7*), the low birth rate in the 1930's (*7*), natural and induced changes in the host-parasite relationship (*5*, *8*, *9*, *10*, *11*), use of new preventives

Table 4. *Average duration per case by age groups, New Haven, 1927–28 and 1948–49*

Age (years)	All sickness		All sickness except S. C. C. D.[1]	
	1927	1948 [2]	1927	1948 [2]
5 and under	19.2	11.6	13.9	9.9
6	16.0	11.1	11.7	9.1
7	14.7	10.2	10.9	8.7
8	12.9	8.7	10.2	8.0
9	12.0	9.0	10.1	7.8
10	10.9	8.7	9.5	7.7
11	10.2	8.3	9.3	7.6
12	10.2	8.0	9.3	7.6
13	10.1	8.0	9.6	7.6
14	9.9	7.7	9.5	7.3
15	9.7	7.4	9.3	7.3
16	8.8	6.3	8.5	6.2
17	8.5	7.0	8.0	6.9
18	8.3	7.0	8.3	7.0

[1] Specific childhood communicable diseases.
[2] Days in 1948 study corrected to a 7-day week basis to agree with 1927 study.

Table 5. *Case rates of sickness due to all causes, by age, New Haven, 1927–28 and 1948–49*

Age (years)	Cases per 100,000 pupil days		Age (years)	Cases per 100,000 pupil days	
	1927	1948		1927	1948
5 and under	619.5	460.8	14	129.4	243.2
6	543.9	673.5	15	137.2	310.9
7	424.8	513.5	16	103.7	310.8
8	287.7	440.2	17	85.0	264.4
9	225.1	353.5	18	61.9	160.9
10	177.5	315.2	19	50.7	63.3
11	160.3	263.3	20 and over	159.3	
12	140.4	237.5			
13	130.6	198.1	All ages	246.6	363.7

and therapeutics (*12*), relaxation of quarantine restrictions (*13, 14*), and expanded and better school health programs (*15*). This important shift in age-specific rates emphasizes the necessity of periodic reevaluation of school health and communicable disease control programs.

Table 6. *Average duration per case of sickness by sex and diagnosis, New Haven, 1927–28 and 1948–49*

Cause of sickness	Average days of sickness			
	Boys		Girls	
	1927	1948 [1]	1927	1948 [1]
Colds	8.9	7.0	9.0	7.0
Diseases of throat and tonsils	9.2	8.1	8.8	8.3
Other respiratory diseases	22.3	12.3	25.4	12.6
Diphtheria	22.9	----------	20.5	----------
Chickenpox	17.6	12.9	17.2	12.6
Measles	21.3	15.5	20.4	15.5
German measles	(3)	8.7	(3)	8.7
Mumps	15.1	12.3	14.5	12.2
Whooping cough	48.2	30.2	50.4	32.9
Scarlet fever	31.5	16.2	31.8	16.2
Two communicable diseases	(2)	24.6	(2)	24.1
Diseases and disorders of the eye	8.7	7.6	8.2	7.4
Earache and ear diseases	15.0	9.5	13.7	9.2
Toothache and disease of teeth	8.1	7.7	8.0	7.1
Digestive diseases and disorders	13.2	8.0	12.4	8.1
Skin diseases	12.0	9.5	15.0	9.7
Accidents, injuries and abrasions	14.2	10.2	12.8	10.6
Miscellaneous sickness	13.5	10.4	12.1	9.9
All sickness	14.0	9.5	13.5	9.4

[1] Days in 1948 corrected to a 7-day-week basis to agree with 1927 study.
[2] Allocated separately to each cause in 1927–28.
[3] Included in miscellaneous other sickness in 1927–28.

Table 7. *Average duration per case of sickness, by age and sex, New Haven, 1927–28 and 1948–49*

Age (years)	Average number of days of sickness per case			
	Boys		Girls	
	1927	1948 [1]	1927	1948 [1]
5 and under	19.5	11.5	18.8	11.8
6	15.9	11.1	16.0	10.9
7	15.4	10.4	14.1	10.2
8	13.0	9.4	12.8	9.2
9	12.3	9.0	11.8	9.0
10	10.9	8.8	11.0	8.4
11	10.2	8.1	10.1	8.3
12	10.0	7.7	10.3	8.1
13	10.1	8.0	10.1	7.8
14	10.4	7.7	9.5	7.6
15	10.4	7.3	8.9	7.7
16	8.5	7.1	9.0	5.6
17	8.6	7.0	8.5	7.0
18	8.2	6.9	8.5	7.1
19	11.8	5.3	9.0	5.2
20 and over	7.0	----------	5.8	----------
All ages	14.0	9.5	13.5	9.4

[1] Days in 1948 study corrected to a 7-day-week basis to agree with 1927 study.

No significant differences are noted in the average duration per case by sex. In fact, there is remarkable uniformity (table 6). The lack of sex difference is again noted in the average duration per case by age (table 7).

Summary

1. A follow-up study on the causes of absenteeism in New Haven schools was made 21 years after the 1927–28 investigation by Wilson et al.

2. The studies are comparable except that the 1927–28 survey included absence over Saturdays, Sundays, and short holidays if the child was absent prior to a week end or legal holiday; while the 1948–49 study considered school days only. Nevertheless, it is considered that the addition of 1 day for each 2.5 days' absence during 1948–49 allows for comparison with the 1927–28 figures.

3. In a smaller school population of 25,606 in 1948–49 compared with 33,700 in 1927–28, 180 school days instead of 186 days, and 4,609,080 pupil days compared with 6,268,200, the absenteeism rate per 100 pupils is 66.3 for 1948–49 compared with 48.6 in 1927–28.

4. The major change is the increase in incidence of respiratory infections; absences attributed to this cause rose from 132.49 to 228.07 per 100,000 pupil days. A particularly important decline in average days of absence per case occurred in the "other respiratory disease" category.

5. The childhood communicable diseases show no marked change in case load, the major change being a decrease in average days of absence per case.

6. There continues to be no demonstrable sex difference.

7. The younger age groups continued to have the highest incidence of illness, but the incidence is consistently higher for each age in 1948–49 except for age 5 and under. The 1948–49 increase in morbidity is most marked in the older children, starting about age 10.

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Reported Incidence of Communicable Diseases in the United States, Third Quarter, 1950

This summary gives provisional figures on cases of communicable diseases reported by the health departments of each State, Alaska, Hawaii, Panama Canal Zone, Puerto Rico, and the Virgin Islands for the third quarter of 1950. The figures are subject to change when final annual figures are released by each State, but in most instances the changes will be small.

Usefulness of the data is limited greatly by wide variation in completeness and accuracy of reporting within and between States and for different diseases. Variation in use of laboratory procedures for confirmation of diagnoses, differing definitions of diseases for reporting purposes, and varying methods of tabulation also contribute to the difficulties of interpretation.

The table gives the numbers of reported cases of selected communicable diseases for each division and State in July, August, and September 1950. Data for diseases reported with low frequencies or by only a few States are given after the table.

Whooping Cough

Reported cases of whooping cough for the quarter totaled 28,403 as compared with 19,668 for the same period in 1949. The 5-year median was 29,216. The States reporting the largest numbers were Texas (3,545), Michigan (2,337), New York (1,739), and Wisconsin (1,630).

Poliomyelitis

The greatest incidence of poliomyelitis in the United States occurs in the third quarter of the year, usually about two-thirds of the total for any given year. In this quarter of 1950, 18,579 cases were reported compared with 29,661 in the same period of 1949. New York State reported the largest number of cases (2,356), followed by Texas (1,481), Illinois (1,112), Michigan (992), California (925), and Ohio (922). All of these States, except Texas, reported fewer cases than in the third quarter of 1949.

Rocky Mountain Spotted Fever

A total of 264 cases was reported during this quarter compared with 300 in the same period of 1949. Nearly one-half (48 percent) of the total for the entire country occurred in 3 South Atlantic States. Maryland reported 29 cases, Virginia 47, and North Carolina 52.

Scarlet Fever and Septic Sore Throat

In the third quarter of 1950, a total of 4,331 cases of scarlet fever

Reported Cases of Selected Communicable Diseases in the United States, Each Division and State, Third Quarter 1950

[Numbers under diseases are International List numbers, 1948 revision]

Area	Brucellosis (044)	Chickenpox (087)	Conjunctivitis [1] (370)	Diphtheria (055)	Dysentery (045–048)		
					Amebic (046)	Bacillary (045)	Unspecified (047, 048)
New England	**29**	**1, 509**	**1**	**31**	**3**	**35**	---------
Maine	2	262	---------	13	---------	2	---------
New Hampshire	---------	24	---------	---------	---------	---------	---------
Vermont	3	131	---------	---------	---------	---------	---------
Massachusetts	7	771	---------	18	1	27	---------
Rhode Island	2	59	---------	---------	---------	---------	---------
Connecticut	15	262	1	---------	2	6	---------
Middle Atlantic	**55**	**3, 165**	**5**	**73**	**227**	**124**	---------
New York	32	1, 402	5	37	214	116	---------
New Jersey	6	946	---------	11	11	4	---------
Pennsylvania	17	817	---------	25	2	4	---------
East North Central	**210**	**3, 087**	**31**	**64**	**266**	**145**	**42**
Ohio	7	658	---------	12	3	11	23
Indiana	17	62	---------	23	---------	1	2
Illinois	112	598	11	14	217	52	---------
Michigan	28	575	20	21	46	81	(*)
Wisconsin	46	1, 194	---------	4	---------	---------	17
West North Central	**205**	**449**	**1**	**41**	**22**	**66**	**7**
Minnesota	56	83	---------	11	16	55	---------
Iowa	66	102	---------	5	1	1	---------
Missouri	18	89	1	9	3	8	6
North Dakota	12	29	---------	---------	---------	---------	---------
South Dakota	10	12	---------	3	(*)	(*)	(*)
Nebraska	4	37	---------	1	1	---------	---------
Kansas	39	97	---------	12	1	2	1
South Atlantic	**94**	**453**	**62**	**370**	**75**	**196**	**1, 666**
Delaware	---------	10	---------	---------	---------	2	---------
Maryland	16	109	---------	14	1	4	---------
District of Columbia	1	66	---------	1	1	20	---------
Virginia	17	135	---------	39	3	---------	1, 657
West Virginia	---------	29	---------	49	---------	18	---------
North Carolina	10	---------	---------	159	23	15	---------
South Carolina	1	---------	---------	46	4	38	---------
Georgia	34	34	31	47	11	88	9
Florida	15	70	31	15	32	11	---------
East South Central	**43**	**165**	**3**	**182**	**117**	**69**	**7**
Kentucky	4	39	1	35	48	18	---------
Tennessee	15	98	2	25	23	28	7
Alabama	13	28	---------	61	14	(*)	(*)
Mississippi	11	---------	---------	61	32	23	(*)
West South Central	**114**	**68**	---------	**250**	**266**	**5, 047**	**3, 286**
Arkansas	9	33	---------	28	25	142	161
Louisiana	11	4	---------	29	02	1	(*)
Oklahoma	32	31	---------	27	13	7	40
Texas	62	---------	---------	166	136	4, 897	3, 085
Mountain	**36**	**702**	**57**	**38**	**107**	**374**	**86**
Montana	10	111	4	7	4	1	---------
Idaho	6	52	4	2	---------	---------	---------
Wyoming	3	21	---------	---------	---------	---------	---------
Colorado	10	127	---------	6	1	12	---------
New Mexico	---------	37	---------	1	11	21	24
Arizona	2	92	7	17	82	340	40
Utah	5	239	---------	5	9	---------	---------
Nevada	---------	23	42	---------	---------	---------	22
Pacific	**45**	**1, 737**	**10**	**41**	**191**	**178**	**66**
Washington	4	---------	---------	4	4	3	55
Oregon	5	---------	10	10	84	3	11
California	36	1, 737	---------	27	103	172	(*)
Third quarter 1950	831	11, 335	170	1, 090	1, 274	6, 234	5, 160
Third quarter 1949	1, 171	10, 524	221	1, 513	1, 440	8, 921	6, 943
Median 1945–49	1, 423	12. 362	179	2, 039	1, 174	7, 109	4, 042
Alaska	---------	53	---------	---------	---------	---------	---------
Hawaii	---------	164	4	2	1	8	---------
Panama Canal Zone [2]	1	91	---------	27	23	4	---------
Puerto Rico [3]	---------	129	---------	140	---------	---------	9
Virgin Islands [2]	---------	3	---------	---------	---------	---------	---------

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*Reported not notifiable. [1] For reported cases of "Ophthalmia neonatorum" see the section following table. [2] Four months, May to August. [3] From weekly reports, June to September.

Reported Cases of Selected Communicable Diseases in the United States, Each Division and State, Third Quarter 1950—Continued

[Numbers under diseases are International List numbers, 1948 revision]

Area	Enceph-alitis, acute infectious (082)	German measles (086)	Hook-worm disease (129)	Influ-enza (480–483)	Malaria (110–117)	Measles (085)	Menin-gitis, menin-gococcal (057.0)
New England	**8**	**441**	----------	**20**	**3**	**2,295**	**23**
Maine	----------	66	----------	14	----------	52	5
New Hampshire	----------	25	----------	2	----------	60	1
Vermont	----------	39	----------	----------	----------	74	----------
Massachusetts	6	255	----------	(*)	1	1,576	9
Rhode Island	----------	1	----------	4	----------	17	2
Connecticut	2	55	----------	----------	2	516	6
Middle Atlantic	**54**	**913**	**41**	**28**	**5**	**7,761**	**106**
New York	42	379	41	[1] 6	2	3,141	46
New Jersey	9	352	----------	11	3	2,271	9
Pennsylvania	3	182	----------	11	----------	2,349	51
East North Central	**41**	**563**	**3**	**195**	**1**	**6,686**	**101**
Ohio	2	126	2	18	----------	1,380	25
Indiana	5	18	----------	4	----------	318	1
Illinois	14	84	----------	14	1	1,732	39
Michigan	13	160	1	4	----------	1,160	21
Wisconsin	7	175	----------	155	----------	2,096	15
West North Central	**30**	**26**	----------	**76**	**1**	**916**	**59**
Minnesota	2	----------	----------	13	1	192	13
Iowa	----------	2	----------	----------	----------	125	11
Missouri	2	8	----------	15	----------	289	14
North Dakota	11	----------	----------	5	----------	62	6
South Dakota	10	----------	----------	----------	----------	54	6
Nebraska	----------	----------	----------	36	----------	107	4
Kansas	5	16	----------	7	----------	87	5
South Atlantic	**8**	**57**	**1,338**	**2,308**	**65**	**1,209**	**83**
Delaware	----------	1	----------	----------	----------	47	3
Maryland	3	33	----------	19	4	137	8
District of Columbia	----------	----------	----------	7	2	37	7
Virginia	----------	----------	----------	1,906	7	416	14
West Virginia	1	17	----------	117	----------	174	15
North Carolina	----------	----------	----------	----------	12	115	16
South Carolina	3	----------	----------	141	32	39	8
Georgia	1	----------	----------	109	7	99	7
Florida	----------	6	1,338	9	1	145	5
East South Central	**15**	**24**	**443**	**213**	**70**	**646**	**84**
Kentucky	2	7	48	2	4	200	20
Tennessee	9	16	4	107	6	276	35
Alabama	3	1	----------	82	35	113	21
Mississippi	1	----------	391	22	25	57	8
West South Central	**32**	**34**	**94**	**6,693**	**682**	**1,757**	**130**
Arkansas	----------	10	1	368	22	155	18
Louisiana	----------	1	82	3	----------	43	13
Oklahoma	9	23	11	266	50	78	10
Texas	23	----------	----------	6,056	610	1,481	89
Mountain	**14**	**173**	**2**	**853**	**3**	**1,561**	**16**
Montana	----------	18	----------	160	----------	47	2
Idaho	3	23	----------	66	----------	215	3
Wyoming	----------	14	----------	----------	----------	35	----------
Colorado	2	28	----------	129	----------	663	----------
New Mexico	----------	5	----------	9	1	60	2
Arizona	3	52	----------	424	2	78	8
Utah	2	33	----------	4	----------	425	1
Nevada	4	----------	2	61	----------	38	----------
Pacific	**159**	**463**	**1**	**157**	**11**	**2,472**	**49**
Washington	1	----------	----------	32	----------	217	5
Oregon	2	----------	1	69	----------	147	7
California	156	463	----------	56	11	2,108	37
Third quarter 1950	361	2,694	1,922	10,543	841	25,303	651
Third quarter 1949	314	3,046	2,500	3,112	1,585	23,135	632
Median 1945–49	314	2,161	2,799	7,581	7,126	23,135	632
Alaska	1	4	----------	8	1	7	----------
Hawaii	----------	29	----------	164	----------	28	2
Panama Canal Zone [2]	----------	69	----------	6	125	494	----------
Puerto Rico [3]	----------	----------	----------	500	34	895	----------
Virgin Islands [2]	----------	----------	----------	----------	----------	----------	----------

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*Reported not notifiable. [1] New York City only. [2] Four months, May to August. [3] From weekly reports, June to September.

Reported Cases of Selected Communicable Diseases in the United States, Each Division and State, Third Quarter 1950—Continued

[Numbers under diseases are International List numbers, 1948 revision]

Area	Mumps (089)	Pneumonia (490–493)	Poliomyelitis				Rheumatic fever (400–402)
			Total (080.0–080.3)	Paralytic (080.0–080.1)	Nonparalytic (080.2)	Unspecified (080.3)	
New England	**1,209**	**337**	**734**	**252**	**186**	**296**	**16**
Maine	112	112	61	37	24		
New Hampshire	17		24			24	
Vermont	200		23			23	
Massachusetts	556	(*)	304	159	107	38	(*)
Rhode Island	5	23	37			37	16
Connecticut	319	202	285	56	55	174	(*)
Middle Atlantic	**4,605**	**2,197**	**3,683**			**3,683**	**150**
New York	1,908	1,413	2,356			2,356	(*)
New Jersey	1,353	333	529			529	(*)
Pennsylvania	1,344	451	778			798	150
East North Central	**3,486**	**1,083**	**3,844**	**975**	**872**	**1,997**	**105**
Ohio	927	[1] 65	922			922	12
Indiana	46	63	286	65	39	182	5
Illinois	614	653	1,112	537	437	138	22
Michigan	852	248	992	373	396	223	64
Wisconsin	1,047	54	532			532	2
West North Central	**484**	**843**	**2,101**	**246**	**130**	**1,725**	**19**
Minnesota	6	131	313	145	119	49	15
Iowa	85	6	868			868	
Missouri	120	92	220			220	
North Dakota	2	525	30			30	2
South Dakota	4		90			90	(*)
Nebraska	120	14	259			259	1
Kansas	147	75	321	101	11	209	1
South Atlantic	**1,020**	**1,442**	**2,909**	**523**	**262**	**2,114**	**72**
Delaware	24		26			26	
Maryland	319	212	392	243	149		14
District of Columbia	72	142	140	46	94		3
Virginia	276	300	868			868	26
West Virginia	66	26	229			229	7
North Carolina			502			502	
South Carolina		58	315			315	11
Georgia	100	591	252	225	14	13	11
Florida	163	113	185	19	5	161	(*)
East South Central	**361**	**998**	**1,221**	**798**	**30**	**393**	**106**
Kentucky	43	182	442	366	17	59	8
Tennessee	170	307	382	382	(*)	(*)	20
Alabama	148	310	187			187	64
Mississippi		199	210	50	13	147	14
West South Central	**441**	**2,679**	**2,256**	**225**	**164**	**1,867**	**18**
Arkansas	163	154	203	70	76	57	3
Louisiana	40	204	223	144	79	(*)	8
Oklahoma	238	157	349	11	9	329	7
Texas		2,164	1,481			1,487	(*)
Mountain	**1,309**	**402**	**357**	**88**	**67**	**202**	**73**
Montana	73	3	24	7	1	16	
Idaho	52	44	59			59	12
Wyoming	61	13	23	11	8	4	1
Colorado	342	130	89	43	38	8	16
New Mexico	46	97	58	27	20	11	13
Arizona	292	74	61			61	22
Utah	410	23	34			34	9
Nevada	33	18	9			9	
Pacific	**2,551**	**571**	**1,474**	**454**	**253**	**767**	**138**
Washington		91	327	14	25	288	53
Oregon		82	222	131	44	47	5
California	2,551	398	925	309	184	432	80
Third quarter 1950	15,466	10,552	18,579	3,571	1,964	13,044	697
Third quarter 1949	16,604	11,376	29,661	6,004	3,376	20,281	819
Median 1945–49	16,604	11,376	16,678	(2)	(2)	(2)	842
Alaska	39	7	4			4	3
Hawaii	22	6	6	6			4
Panama Canal Zone [3]	640	[4] 124	4			4	5
Puerto Rico [5]			10			10	
Virgin Islands [3]							

*Reported not notifiable. [1] July only. [2] Not available. [3] Four months, May to August. [4] Canal Zone only for May and June. [5] From weekly reports, June to September.

Reported Cases of Selected Communicable Diseases in the United States, Each Division and State, Third Quarter 1950—Continued

[Numbers under diseases are International List numbers, 1948 revision]

Area	Rocky Mountain spotted fever (104)	Scarlet fever (050)	Septic sore throat (051)	Smallpox (084)	Tetanus (061)	Trachoma (095)	Trichiniasis (128)
New England	----------	**402**	**69**	----------	**17**	----------	**22**
Maine	----------	21	7	----------	5	----------	6
New Hampshire	----------	[1] 34	(1)	----------	----------	----------	----------
Vermont	----------	15	----------	----------	----------	----------	----------
Massachusetts	----------	271	16	----------	6	----------	15
Rhode Island	----------	10	4	----------	4	----------	1
Connecticut	----------	51	42	----------	2	----------	----------
Middle Atlantic	**27**	**664**	**13**	----------	**10**	----------	**47**
New York	10	[1] 351	(1)	----------	6	----------	39
New Jersey	5	83	13	----------	2	----------	1
Pennsylvania	12	230	----------	----------	2	----------	7
East North Central	**20**	**1,045**	**68**	----------	**21**	**9**	**5**
Ohio	5	449	6	----------	3	----------	2
Indiana	4	70	3	----------	5	----------	2
Illinois	10	147	15	----------	6	2	----------
Michigan	1	252	35	----------	7	1	1
Wisconsin	----------	127	9	----------	----------	6	----------
West North Central	**3**	**229**	**31**	**1**	**14**	**120**	**3**
Minnesota	----------	41	27	----------	4	----------	3
Iowa	----------	26	2	----------	----------	----------	----------
Missouri	2	52	----------	----------	5	117	----------
North Dakota	----------	19	----------	----------	1	----------	----------
South Dakota	----------	2	1	----------	----------	3	----------
Nebraska	----------	[1] 55	(1)	----------	1	----------	----------
Kansas	1	34	1	1	3	----------	----------
South Atlantic	**140**	**609**	**962**	----------	**33**	----------	**3**
Delaware	----------	•3	----------	----------	----------	----------	2
Maryland	29	43	9	----------	3	----------	1
District of Columbia	----------	15	----------	----------	2	----------	----------
Virginia	47	118	840	----------	6	----------	----------
West Virginia	2	33	39	----------	----------	----------	----------
North Carolina	52	275	5	----------	----------	----------	----------
South Carolina	6	38	8	----------	----------	----------	----------
Georgia	4	70	45	----------	9	----------	----------
Florida	----------	14	16	----------	13	----------	(*)
East South Central	**25**	**543**	**72**	**1**	**28**	**11**	----------
Kentucky	3	142	39	----------	1	11	----------
Tennessee	12	263	33	----------	10	----------	----------
Alabama	9	81	(*)	----------	9	----------	(*)
Mississippi	1	57	(*)	1	8	----------	(*)
West South Central	**19**	**249**	**3,510**	----------	**18**	**31**	**3**
Arkansas	13	27	537	----------	10	----------	----------
Louisiana	2	17	----------	----------	7	----------	----------
Oklahoma	4	63	86	----------	1	11	3
Texas	----------	142	2,887	----------	(*)	20	(*)
Mountain	**27**	**104**	**642**	----------	**1**	**87**	----------
Montana	7	5	40	----------	----------	----------	----------
Idaho	6	14	67	----------	1	----------	----------
Wyoming	3	1	----------	----------	----------	----------	----------
Colorado	6	30	58	----------	----------	----------	----------
New Mexico	1	11	1	----------	----------	10	----------
Arizona	----------	25	399	----------	----------	76	----------
Utah	4	11	13	----------	----------	----------	----------
Nevada	----------	7	64	----------	----------	1	----------
Pacific	**3**	**486**	**138**	----------	**22**	**9**	**5**
Washington	----------	62	6	----------	----------	2	----------
Oregon	2	32	59	----------	----------	3	2
California	1	392	73	----------	22	4	3
Third quarter 1950	264	4,331	5,505	2	164	267	88
Third quarter 1949	300	4,046	3,719	4	196	405	71
Median 1945–49	308	6,311	3,719	9	167	372	86
Alaska	----------	2	9	----------	----------	----------	----------
Hawaii	----------	1	----------	----------	6	----------	----------
Panama Canal Zone [2]	----------	3	----------	----------	5	----------	----------
Puerto Rico [3]	----------	----------	----------	----------	54	----------	----------
Virgin Islands [2]	----------	----------	----------	----------	----------	----------	----------

*Reported not notifiable. [1] Cases reported as septic sore throat included with scarlet fever. [2] Four months, May to August. [3] From weekly reports, June to September.

Reported Cases of Selected Communicable Diseases in the United States, Each Division and State, Third Quarter 1950—Continued

[Numbers under diseases are International List numbers, 1948 revision]

Area	Tuberculosis		Tularemia (059)	Typhoid fever (040)	Paratyphoid fever[1] (041)	Typhus fever, endemic (101)	Whooping cough (056)
	All forms (001–019)	Respiratory (001–008)					
New England	**1,298**	**1,148**	**2**	**26**	**24**	----------	**3,213**
Maine	134	116	----------	5	1	----------	586
New Hampshire	34	----------	----------	3	----------	----------	126
Vermont	83	58	----------	1	----------	----------	354
Massachusetts	623	589	2	10	23	----------	1,095
Rhode Island	113	101	----------	4	----------	----------	457
Connecticut	311	284	----------	3	----------	----------	595
Middle Atlantic	**5,388**	**3,104**	**1**	**108**	**28**	**5**	**4,361**
New York	3,325	3,104	----------	25	16	5	1,739
New Jersey	764	----------	1	9	3	----------	1,273
Pennsylvania	1,299	----------	----------	74	9	----------	1,349
East North Central	**4,109**	**2,300**	**16**	**109**	**55**	----------	**6,579**
Ohio	(*)	(*)	----------	45	3	----------	1,420
Indiana	518	481	7	21	3	----------	344
Illinois	1,940	1,819	8	29	1	----------	848
Michigan	1,416	(*)	----------	12	42	----------	2,337
Wisconsin	235	----------	1	2	6	----------	1,630
West North Central	**1,844**	**276**	**12**	**46**	**10**	----------	**1,796**
Minnesota	670	----------	1	2	10	----------	349
Iowa	112	47	----------	3	----------	----------	479
Missouri	666	----------	8	31	----------	----------	396
North Dakota	78	69	1	----------	----------	----------	119
South Dakota	90	----------	----------	----------	----------	----------	46
Nebraska	61	----------	----------	2	----------	----------	64
Kansas	167	160	2	8	----------	----------	343
South Atlantic	**4,653**	**3,876**	**39**	**174**	**58**	**67**	**3,190**
Delaware	79	79	----------	2	----------	----------	42
Maryland	641	606	4	10	----------	----------	488
District of Columbia	334	316	----------	3	2	----------	72
Virginia	768	754	15	32	7	2	491
West Virginia	447	431	----------	23	2	----------	558
North Carolina	820	768	5	24	4	3	1,046
South Carolina	----------	----------	2	36	4	1	142
Georgia	939	922	10	32	21	52	229
Florida	625	----------	3	12	18	9	122
East South Central	**3,252**	**1,498**	**16**	**164**	**18**	**76**	**1,243**
Kentucky	1,150	1,115	1	76	1	1	363
Tennessee	1,026	(*)	7	47	11	10	499
Alabama	674	(*)	1	26	6	59	302
Mississippi	402	383	7	15	----------	6	79
West South Central	**2,759**	**1,604**	**116**	**291**	**31**	**116**	**4,200**
Arkansas	517	504	85	55	2	3	322
Louisiana	618	591	4	39	2	30	41
Oklahoma	517	509	19	50	5	----------	292
Texas	1,107	(*)	8	147	22	83	3,545
Mountain	**1,444**	**989**	**33**	**42**	**14**	----------	**1,558**
Montana	95	92	7	4	----------	----------	203
Idaho	44	----------	1	5	4	----------	168
Wyoming	23	22	4	----------	----------	----------	42
Colorado	335	----------	1	12	5	----------	313
New Mexico	215	211	1	17	1	----------	314
Arizona	630	616	----------	4	3	----------	392
Utah	70	48	18	----------	1	----------	115
Nevada	32	----------	1	----------	----------	----------	11
Pacific	**2,917**	**2,372**	**2**	**49**	**121**	----------	**2,263**
Washington	424	----------	----------	2	13	----------	606
Oregon	163	153	1	3	3	----------	373
California	2,330	2,219	1	44	105	----------	1,284
Third quarter 1950	27,664	17,167	237	1,009	359	264	28,403
Third quarter 1949	29,706	17,342	308	1,214	568	338	19,668
Median 1945–49	29,706	17,342	267	1,216	366	612	29,216
Alaska	----------	----------	1	3	----------	----------	32
Hawaii	85	----------	----------	----------	----------	----------	11
Panama Canal Zone[2]	[3] 85	[3] 83	----------	8	2	2	32
Puerto Rico[4]	1,414	----------	----------	20	----------	8	820
Virgin Islands[2]	1	1	----------	----------	----------	----------	34

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*Reported not notifiable. [1] Includes salmonellosis. [2] Four months, May to August. [3] Canal Zone only for May and June. [4] From weekly reports, June to September.

was reported compared with 4,046 in the same period of 1949 and a 5-year median of 6,311. Cases of septic sore throat totaled 5,505 in this quarter compared with 3,719 in 1949, and a 5-year median of 3,719. The figures for the past 6 years show that while reported cases of scarlet fever have been decreasing, reports of septic sore throat have increased. This relative change is just as evident in the figures for the first quarter of the year which is the period of highest incidence of these streptococcal infections.

Other Diseases

Some diseases such as brucellosis, diphtheria, malaria, smallpox, typhoid fever, and typhus fever were reported in smaller numbers for the quarter than for the previous 5-year period. Some are being studied intensively and for most of them various preventive measures are applied.

Additional Diseases

Figures for additional diseases reported by State health departments in the third quarter of 1950 and not shown in the table are given below. Also included are diseases reported by the Territories and Possessions. Figures for the Panama Canal Zone are for May to August; Puerto Rico (from weekly reports) for June to September; and Virgin Islands for May to August. The numbers in parentheses are from the Manual of the International Statistical Classification of Diseases, Injuries, and Causes of Death, World Health Organization, 1948.

Actinomycosis (132): Colorado 2, Georgia 1, Iowa 1, Minnesota 5, New York 1, Pennsylvania 1.

Anthrax (062): Colorado 1, Maryland 1, New Hampshire 1, New Jersey 1, Pennsylvania 7, Texas. 1.

Cancer (140–205): Alabama 1,191, Arkansas 145, Colorado 834, Florida 1,414, Georgia 71, Idaho 271, Kansas 1,218, Louisiana 705, Montana 369, Nevada 6, New Mexico 217, North Dakota 251, Pennsylvania 2,225, South Carolina 78, Tennessee 957, Utah 86, Wyoming 102, Alaska 1, Virgin Islands 2.

Coccidioidomycosis (133): Arizona 30, California 15.

Colorado tick fever (096.9): Colorado 21, Wyoming 2.

Dengue (090): Mississippi 1, Texas 7.

Diarrhea of the newborn (764): California 4, Florida 9, Illinois 17, Kansas 1, Maryland 1, Minnesota 1, New Jersey 1, New Mexico 5, New York 7, Ohio 53, Oklahoma 5, Pennsylvania 2, West Virginia 7.

Diarrhea, unspecified (571): Florida 17, Kentucky 23, Maryland 9, Michigan 19, Minnesota 7, New Mexico 41, New York 35, Ohio 541, Pennsylvania 69, Tennessee 53, Washington 1, Alaska 1.

Encephalitis, myelitis, and encephalomyelitis, except acute infections (343): Colorado 2, Iowa 1, Maryland 3, North Carolina 2, Ohio 8, Utah 2, Washington 2.

Erysipelas (052): Arkansas 2, Connecticut 9, Georgia 3, Idaho 2, Illinois 23, Indiana 2, Kansas 1, Kentucky 1, Louisiana 1, Maryland 1, Michigan 19, Minnesota 1, Missouri 3, Montana 1, Nebraska 1, New Mexico 1, North Dakota 1, Ohio 1, Oregon 6, Pennsylvania 8, Tennessee 7, Wisconsin 7, Alaska 1, Hawaii 4.

Favus (131 part): Nevada 3.

Food poisoning (049.2): California 197, Connecticut 56, Idaho 18, Illinois 102, Indiana 2, Louisiana 6, Minnesota 6, Nevada 17, New Mexico 6, New York 216, Ohio 7, Oklahoma 8, Oregon 5, Pennsylvania 59, Utah 3, Alaska 15, Panama Canal Zone 3.

Glandular fever (infectious mononucleosis) (093): Arizona 11, Connecticut 35, Idaho 2, Kentucky 2, Maryland 5, Michigan 23, Minnesota 97, New Hampshire 1, Oklahoma 6, Pennsylvania 3, Tennessee 12, Washington 4.

Hepatitis, infectious (092): California 103, Connecticut 1, Florida 8, Idaho 5, Illinois 9, Iowa 14, Kansas 1, Kentucky 3, Maryland 8, Michigan 5, Minnesota 407 (Includes 400 cases estimated to have occurred in Stearns County during an outbreak with onset in November 1949), Montana 10, Nevada 2, New York 92, Oregon 34, Pennsylvania 69, Tennessee 53, Washington 1, Alaska 1.

Impetigo (695;766): Colorado 10, Connecticut 5, Idaho 6, Illinois 5, Indiana 3, Iowa 4, Kansas 10, Kentucky 25, Maryland 1, Michigan 125, Missouri 14, Montana 2, Nevada 40, New York 14, North Dakota 6, Ohio 1, Alaska 3, Hawaii 61.

Leprosy (060): California 1, New Jersey. 1, New York 2, Texas 7, Hawaii 10, Panama Canal Zone 1.

Meningitis, except meningococcal and tuberculous (034): Colorado 2, Idaho 3, Illinois 33, Indiana 12, Iowa 6, Kentucky 4, Maryland 4, Massachusetts 32, Michigan 5, Minnesota 4, Mississippi 26, New Mexico 3, New York 36, Ohio 18, Rhode Island 11, Utah 1, Vermont 1, Washington 12, West Virginia 1.

Ophthalmia neonatorum (033;765): Arkansas 2, Florida 4, Georgia 2, Illinois 39, Louisiana 2, Massachusetts 29, Michigan 7, Mississippi 8, New Jersey 3, New Mexico 2, New York 7, Ohio 143, Oregon 2, Pennsylvania 3, South Carolina 2, Tennessee 5, Texas 10.

Pellagra (281): Alabama 4, Arizona 1, Arkansas 4, Georgia 20, Louisiana 1, Nevada 2, New Mexico 1, Oklahoma 3, Tennessee 13, Virginia 3.

Plague (050): Arizona 1, New Mexico 1.

Psittacosis (096.2): California 2, Louisiana 1, New York 1.

Rabies (094): Arizona 1, Pennsylvania 3, Tennessee 1, West Virginia 1.

Relapsing fever (071): California 4, Nevada 2, Oregon 2, Texas 4, Panama Canal Zone, 1.

Rickettsialpox (108): New York City 33.

Ringworm of the scalp (131 part): Connecticut 10, Georgia 12, Illinois 89, Indiana 9, Iowa 27, Kansas 17, Kentucky 18, Minnesota 1, Missouri 3, Nevada 6, Ohio 1, Oklahoma 7, Oregon 19, South Carolina 3, Utah 3, Virginia 69, Washington 144, Alaska 1.

Scabies (135): Idaho 9, Kentucky 30, Maryland 1, Michigan 65, Missouri 7, Nevada 13, Pennsylvania 21, Alaska 13.

Schistosomiasis (123): New York 16.

Vincent's infection (070): Colorado 20, Florida 24, Georgia 2, Idaho 12, Illinois 9, Indiana 3, Kansas 3, Kentucky 10, Maryland 4, Nevada 11, New Hampshire 3, Ohio 2, Oklahoma 17, Rhode Island 1, South Dakota 1, Tennessee 14.

Weil's disease (072): Michigan 5.

* * * * * * *

Rabies in animals: Alabama 73, Arizona 2, Arkansas 14, California 27, Colorado 9, Florida 5, Georgia 76, Illinois 20, Indiana 116, Iowa 112, Kansas 10, Kentucky 130, Michigan 60, Mississippi 12, New Mexico 2, New York 327, Ohio 60, Oklahoma 32, Pennsylvania 36, South Carolina 81, Tennessee 51, Texas 216, Virginia 14, West Virginia 27, Wisconsin 7.

Incidence of Disease

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

Reports From States for Week Ending December 9, 1950

Influenza

There was an increase in reported cases of influenza for the current week, 3,461, as compared with the previous week when 2,560 cases were reported. States reporting more than 100 cases were: Texas (2,251), Virginia (320), Arizona (186), West Virginia (181), Arkansas (144), and Oklahoma (144). Hawaii, where laboratory tests have shown antibody rise to type A influenza virus, reported 96 new cases for the current week as compared with 30 for the previous week.

Meningococcal Meningitis

There were 80 new cases of meningococcal meningitis reported for

Comparative Data for Cases of Specified Reportable Diseases: United States

[Numbers after diseases are International List numbers, 1948 revision]

Disease	Total for week ended—		5-year median 1945–49	Seasonal low week	Cumulative total since seasonal low week		5-year median 1944–45 through 1948–49	Cumulative total for calendar year		5-year median 1945–49
	Dec. 9, 1950	Dec. 10, 1949			1949–50	1948–49		1950	1949	
Anthrax (062)	1	------	(1)	(1)	(1)	(1)	(1)	43	51	(1)
Diphtheria (055)	132	209	401	27th	2,573	3,829	5,342	5,701	7,597	11,639
Acute infectious encephalitis (082)	20	11	8	(1)	(1)	(1)	(1)	953	731	605
Influenza (480–483)	3,461	2,554	2,813	30th	[2]28,457	23,180	25,204	[2]274,716	99,047	167,455
Measles (085)	3,008	2,009	2,787	35th	[2]18,254	12,570	18,238	[2]306,425	601,088	584,626
Meningococcal meningitis (057.0)	80	56	69	37th	741	709	709	3,540	3,225	3,253
Pneumonia (490–493)	1,551	1,582	------	(1)	(1)	(1)	(1)	[2]76,282	73,049	------
Acute poliomyelitis (080)	480	322	241	11th	[3]31,343	40,851	24,296	[3]32,474	41,764	24,763
Rocky Mountain spotted fever (104)	1	------	1	(1)	(1)	(1)	(1)	452	558	558
Scarlet fever (050)	1,194	1,461	2,116	32d	11,673	12,850	16,879	51,843	70,516	78.001
Smallpox (084)	------	1	1	35th	11	7	13	37	48	160
Tularemia (059)	16	22	32	(1)	(1)	(1)	(1)	841	1,040	962
Typhoid and paratyphoid fever (040, 041)[4]	54	51	51	11th	[5]2,798	3,249	3,249	[5]3,307	3,737	3,737
Whooping cough (056)	1,967	2,227	2,252	39th	16,964	16,954	17,880	114,159	63,556	93,755

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[1] Not computed. [2] Additions, week ended Dec. 2: Nebraska, influenza, 3 cases and measles, 3; Tennessee, pneumonia, 34 cases. [3] Addition: Iowa, delayed report, 7 cases. Deductions: Maine, week ended Sept. 30, 1 case; Georgia, week ended Dec. 2, 1 case. [4] Including cases reported as salmonellosis. [5] Deduction: North Carolina, week ended July 29, 1 case.

the current week as compared with 56 cases for the same week last year. The cumulative total for 1950 is 3,540 as compared with 3,253 for the same period in 1949.

Other Diseases

A total of 3,008 cases of measles was reported for the current week, and of these, 924 were reported in the East North Central States. New cases of tularemia decreased from 23 for the previous week to 16 for the current week. Poliomyelitis decreased nearly 20 percent from the previous week (597 to 480). The cumulative total for 1950 is 32,474 as compared with 41,764 for the same period last year.

Report of Epidemic

A release by Dr. J. C. Geiger, Director of Public Health in San Francisco, reports a diphtheria episode in the San Francisco Hospital. On November 4, 1950, a 39-year-old man was admitted to a 50-bed ward. One week later he developed sore throat and a fever. A throat culture showed a virulent strain of the mitis type of the diphtheria bacillus. The patient was Shick positive. Two mild secondary cases developed—one was a nurse— both of whom were Shick positive. Seven other persons—one an intern—were found to be carrying the organism, and all were Shick negative.

Deaths During Week Ended Dec. 9, 1950

	Week ended Dec. 9, 1950	*Corresponding week, 1949*
Data for 94 large cities of the United States:		
Total deaths	9, 682	9, 535
Median for 3 prior years	9, 535	----------
Total deaths, first 49 weeks of year	448, 990	449, 379
Deaths under 1 year of age	716	701
Median for 3 prior years	700	----------
Deaths under 1 year of age, first 49 weeks of year	30, 655	32, 066
Data from industrial insurance companies:		
Policies in force	69, 616, 911	69, 975, 135
Number of death claims	12, 995	13, 288
Death claims per 1,000 policies in force, annual rate	9. 7	9. 9
Death claims per 1,000 policies, first 49 weeks of year, annual rate	9. 2	9. 1

Reported Cases of Selected Communicable Diseases: United States, Week Ended Dec. 9, 1950

[Numbers under diseases are International List numbers, 1948 revision]

Area	Diphtheria (055)	Encephalitis, infectious (082)	Influenza (480–483)	Measles (085)	Meningitis, meningococcal (057.0)	Pneumonia (490–493)	Poliomyelitis (080)
United States	**132**	**20**	**3, 461**	**3, 008**	**80**	**1, 551**	**480**
New England	**7**	**2**	**1**	**89**	**5**	**55**	**19**
Maine	2	---	---	1	---	2	---
New Hampshire	3	---	---	---	---	---	---
Vermont	---	---	---	25	---	---	---
Massachusetts	2	2	---	49	4	---	10
Rhode Island	---	---	---	6	---	---	---
Connecticut	---	---	1	8	1	53	9
Middle Atlantic	**7**	**5**	**2**	**532**	**12**	**469**	**84**
New York	3	5	[1]1	214	11	357	62
New Jersey	---	---	1	87	---	64	7
Pennsylvania	4	---	---	231	1	48	15
East North Central	**11**	**2**	**34**	**924**	**10**	**115**	**108**
Ohio	5	---	1	168	3	---	32
Indiana	---	---	19	14	---	13	8
Illinois	3	1	1	270	3	40	21
Michigan	3	1	5	138	1	44	34
Wisconsin	---	---	8	334	3	18	13
West North Central	**5**	---	**21**	**267**	**8**	**147**	**62**
Minnesota	3	---	1	52	3	6	10
Iowa	---	---	---	---	1	2	6
Missouri	2	---	3	109	3	18	8
North Dakota	---	---	10	7	---	115	---
South Dakota	---	---	---	7	---	---	28
Nebraska	---	---	---	---	---	---	4
Kansas	---	---	7	92	1	6	6
South Atlantic	**24**	---	**563**	**207**	**17**	**211**	**62**
Delaware	---	---	---	5	---	---	1
Maryland	---	---	1	3	1	31	4
District of Columbia	---	---	1	4	---	24	1
Virginia	2	---	320	99	5	115	11
West Virginia	3	---	181	20	2	7	4
North Carolina	6	---	---	19	5	---	12
South Carolina	5	---	37	1	1	7	2
Georgia	5	---	22	49	1	18	9
Florida	3	---	1	7	2	9	18
East South Central	**27**	**1**	**53**	**75**	**12**	**66**	**13**
Kentucky	9	---	---	5	5	18	1
Tennessee	4	---	31	32	3	---	6
Alabama	12	---	17	2	2	26	---
Mississippi	2	1	5	36	2	22	6
West South Central	**38**	**4**	**2, 539**	**213**	**9**	**393**	**28**
Arkansas	1	---	144	20	---	34	3
Louisiana	1	1	---	4	---	30	11
Oklahoma	4	1	144	40	1	30	4
Texas	32	2	2, 251	149	8	299	10
Mountain	**1**	---	**231**	**282**	---	**47**	**16**
Montana	---	---	10	21	---	---	---
Idaho	---	---	13	39	---	---	1
Wyoming	---	---	---	3	---	---	---
Colorado	---	---	21	151	---	31	3
New Mexico	---	---	---	24	---	6	7
Arizona	1	---	186	14	---	9	5
Utah	---	---	1	26	---	---	---
Nevada	---	---	---	4	---	1	---
Pacific	**12**	**6**	**17**	**419**	**7**	**48**	**88**
Washington	2	1	---	166	3	10	19
Oregon	---	---	10	24	---	10	11
California	10	5	7	229	4	28	58
Alaska	---	---	2	---	---	2	2
Hawaii	---	---	96	3	---	---	1

[1] New York City only.

Anthrax: Massachusetts, 1 case.

Reported Cases of Selected Communicable Diseases: United States, Week Ended Dec. 9, 1950—Continued

[Numbers under diseases are International List numbers, 1948 revision]

Area	Rocky Mountain spotted fever (104)	Scarlet fever (050)	Smallpox (084)	Tularemia (059)	Typhoid and paratyphoid fever[1] (040, 041)	Whooping cough (056)	Rabies in animals
United States	**1**	**1,194**		**16**	**54**	**1,967**	**101**
New England		**129**			**2**	**313**	
Maine		19				50	
New Hampshire		3				1	
Vermont		8				72	
Massachusetts		82			1	93	
Rhode Island		2			1	43	
Connecticut		15				54	
Middle Atlantic		**170**			**5**	**342**	**25**
New York		[2] 88			4	134	22
New Jersey		21			1	135	
Pennsylvania		61				73	3
East North Central		**322**		**4**	**6**	**445**	**9**
Ohio		90		1	1	65	4
Indiana		32		2		69	
Illinois		47		1	3	31	1
Michigan		117			2	156	4
Wisconsin		36				124	
West North Central		**82**			**3**	**113**	**5**
Minnesota		14				33	1
Iowa		27				24	4
Missouri		12			1	10	
North Dakota		2			1	3	
South Dakota		2				4	
Nebraska		10					
Kansas		15			1	39	
South Atlantic	**1**	**164**		**6**	**6**	**292**	**11**
Delaware		2				6	
Maryland	1	7			1	23	
District of Columbia		6				3	
Virginia		33		4		122	1
West Virginia		10			1	38	
North Carolina		76		1	1	54	
South Carolina		5			1	7	4
Georgia		15		1	2	15	6
Florida		10				24	
East South Central		**99**		**5**	**5**	**50**	**17**
Kentucky		26				8	7
Tennessee		44		3	3	32	8
Alabama		19				9	2
Mississippi		10		2	2	1	
West South Central		**76**			**12**	**236**	**33**
Arkansas		4			1	48	2
Louisiana		17			5	10	
Oklahoma		22				18	2
Texas		33			6	160	29
Mountain		**57**		**1**	**2**	**118**	
Montana		7				28	
Idaho		15					
Wyoming						10	
Colorado		10		1		19	
New Mexico		5				29	
Arizona					2	31	
Utah		19				1	
Nevada		1					
Pacific		**95**			**13**	**58**	**1**
Washington		69			2	13	
Oregon		21			2	11	1
California		5			9	34	
Alaska							
Hawaii		1					

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[1] Including cases reported as salmonellosis.
[2] Including cases reported as streptococcal sore throat.

FOREIGN REPORTS

CANADA

Reported Cases of Certain Diseases—Week Ended November 25, 1950

Disease	New-found-land	Prince Ed-ward Island	Nova Scotia	New Bruns-wick	Que-bec	On-tario	Mani-toba	Sas-katch-ewan	Al-berta	Brit-ish Co-lum-bia	Total
Brucellosis					3	2	1				6
Chickenpox	2		76	4	219	510	85	150	135	111	1, 292
Diphtheria				2	3						5
Dysentery, bacillary					2						2
German measles			18	3	12	48		12	19	45	157
Influenza			90			3	2			2	97
Measles	4		13		344	787	35	30	10	45	1, 268
Meningitis, meningococcal			1	1		2			1	1	6
Mumps	18		11	1	107	280	47	102	182	165	913
Poliomyelitis				1		1		1	1	1	5
Scarlet fever	2			1	79	39	21	21	76	41	280
Tuberculosis (all forms)	25		10	3	43	24	15	8	11	38	177
Typhoid and paratyphoid fever					9		1	1			11
Venereal diseases:											
Gonorrhea	4		8	4	94	70	29	15	42	71	337
Syphilis (total)	3		5	3	48	19	5	10	4	10	107
Primary					10	3		4	1		18
Secondary					4	1					5
Other	3		5	3	34	15	5	6	3	10	84
Whooping cough	1		13	9	66	156	10	6	2	31	294

FINLAND

Reported Cases of Certain Diseases—October 1950

Disease	Cases	Disease	Cases
Diphtheria	48	Scarlet fever	2, 693
Dysentery	1	Typhoid fever	7
Meningitis, meningococcal	12	Venereal diseases:	
Paratyphoid fever	122	Gonorrhea	647
Poliomyelitis	70	Syphilis	45

NORWAY

Reported Cases of Certain Diseases—September 1950

Disease	Cases	Disease	Cases
Anthrax	1	Paratyphoid fever	1
Diphtheria	31	Pneumonia (all forms)	1, 762
Dysentery, unspecified	1	Poliomyelitis	236
Encephalitis, infectious	2	Rheumatic fever	88
Erysipelas	370	Scabies	873
Gastroenteritis	3, 820	Scarlet fever	138
Hepatitis, infectious	102	Tuberculosis (all forms)	277
Impetigo contagioso	2, 285	Typhoid fever	1
Influenza	3, 159	Venereal diseases:	
Malaria	2	Gonorrhea	229
Measles	220	Syphilis	67
Meningitis, meningococcal	11	Other forms	1
Mumps	74	Whooping cough	1, 917

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

The following tables are not complete or final for the list of countries included or for the figures given. Since many of the figures are from weekly reports, the accumulated totals are for approximate dates.

CHOLERA

(Cases)

Place	January-September 1950	October 1950	November 1950—week ended—			
			4	11	18	25
ASIA						
Burma	467	59	14	56	175	
Akyab	2					
Bassein	3					
Kyaukpyu	2					
Maubin	3					
Moulmein	1					
Pegu	1					
Rangoon	6					[1] 1
Toungoo	8					
India	116,104	20,917	[2] 2,831	[2] 1,582	[2] 292	[2] 81
Ahmedabad	10					
Allahabad	3					
Bombay	[3] 429	[1] 1				
Calcutta	9,057	105	29	53	45	46
Cawnpore	1					
Cocanada	2					
Cuddalore	38	13	1	1	1	1
Lucknow	12					
Madras	[3] 265	620	48	49	22	25
Masulipatam	47					
Nagpur	60	11				
Negapatam	98		4	7	7	1
New Delhi	125					
Port Blair (Andaman Islands)	[1] 2					
Tellicherry	27					
Tiruchirappali	1		3	2	10	8
Trichinopoly	1					
Tuticorin	26					
India (French)	1,152	20	22	7	8	
Karikal	390	15	14	7	8	
Pondicherry	762	5	8			
India (Portuguese)	17					
Indochina:						
Cambodia	5	4		6		
Viet Nam	15					
Giadinh	3					
Rachgia	1					
Saigon	1					
Pakistan	23,817	688	318	[2] 3	[2] 20	
Chittagong	186					
Dacca	192					

[1] Imported. [2] Preliminary. [3] Includes imported cases.

PLAGUE

(Cases)

AFRICA						
Belgian Congo	28	2				
Costermansville Province	14					
Stanleyville Province	14	2				
Madagascar	56	20		[1] 7		
Rhodesia, Northern	2					
Union of South Africa	11	6				
Cape Province		3				
Orange Free State	8	3				
Transvaal Province	1					
Johannesburg	1					
ASIA						
Burma	241	12	2	4	3	
Bassein	1					
Bhamo	[2] 4					
Henzada	15					
Kyaiklat	34					
Minhla	2					
Moulmein	[2] 3					

PLAGUE—Continued

Place	January-September 1950	October 1950	November 1950—week ended—			
			4	11	18	25
ASIA—continued						
Burma—Continued						
Myaungmya	5	------	------	------	------	------
Myingyan	2	------	------	------	------	------
Pegu	[2] 5	------	------	------	------	------
Prome	[2] 1	------	------	------	------	------
Pyapon	[2] 3	------	------	------	------	------
Rangoon	[2] 8	------	------	------	------	------
Yenangyaung	58	------	------	------	------	------
China:						
Chekiang Province	42	------	------	------	------	------
Wenchow	[4] 4	------	------	------	------	------
Fukien Province	988	------	------	------	------	------
Amoy	10	------	------	------	------	------
Kwangsi Province	[4] 63	------	------	------	------	------
Kwangtung Province	627	------	------	------	------	------
India	38,753	1,464	[5] 273	[5] 91	[5] 63	------
Allahabad	[3] 19	------	------	------	------	------
Bombay	[2] 5	------	------	------	------	------
Calcutta	[2] 3	------	------	------	------	------
Cawnpore	18	------	------	------	------	------
Lucknow	[2] 10	------	------	------	------	------
Indochina:						
Cambodia	[6] 46	------	------	------	------	------
Pnompenh	3	------	------	------	------	------
Viet Nam	112	9	4	3	3	1
Phanthiet	82	9	------	------	3	------
Saigon	1	------	------	------	------	------
Laos	2	------	------	------	------	------
Indonesia:						
Java	237	6	------	------	------	------
Bandoeng	6	------	------	------	------	------
Djakarta	3	------	------	------	------	------
Jogjakarta	228	6	------	------	------	------
Pakistan	[3] 1	------	------	------	------	------
Karachi	[3] 1	------	------	------	------	------
Thailand	56	------	------	------	------	------
SOUTH AMERICA						
Brazil	33	------	------	------	------	------
Alagoas State	8	------	------	------	------	------
Bahia State	9	------	------	------	------	------
Ceara State	2	------	------	------	------	------
Paraiba State	5	------	------	------	------	------
Pernambuco State	8	------	------	------	------	------
Sao Paulo State: Santos	[3] 1	------	------	------	------	------
Ecuador	27	------	------	------	------	------
Chimborazo Province	4	------	------	------	------	------
El Oro Province	4	------	------	------	------	------
Loja Province	[7] 19	------	------	------	------	------
Peru	28	------	------	------	------	------
Ancash Department	3	------	------	------	------	------
Lambayeque Department	2	------	------	------	------	------
Libertad Department	1	------	------	------	------	------
Lima Department	11	------	------	------	------	------
Piura Department	11	------	------	------	------	------
Venezuela	5	------	------	------	------	------
Miranda State	5	------	------	------	------	------

[1] Nov. 1–10, 1950. [2] Includes imported cases. [3] Imported. [4] Deaths. [5] Preliminary figures. [6] Includes suspected cases. [7] Corrected figure.

SMALLPOX

(Cases)

Place	January-September 1950	October 1950	4	11	18	25
AFRICA						
Algeria	101	7	------	[1] 5	------	------
Angola	270	------	------	------	------	------
Bechuanaland	122	------	------	------	------	------
Belgian Congo	3,617	497	149	85	57	132
British East Africa:						
Kenya	12	------	------	------	------	------
Nyasaland	256	9	3	4	2	------
Tanganyika	4,104	347	------	------	------	------
Uganda	3	------	------	------	------	------

SMALLPOX—Continued

Place	January-September 1950	October 1950	November 1950—week ended—			
			4	11	18	25
AFRICA—continued						
Cameroon (British	424	11	------	------	------	------
Cameroon (French)	94	32	------	[1] 7	------	------
Dahomey	346	57	------	[1] 3	[2] 3	------
Egypt	[3] 4	2	------	------	------	------
Eritrea	1	------	------	------	------	------
Ethiopia	36	------	------	------	------	------
French Equatorial Africa	454	------	------	------	------	------
French Guinea	12	------	------	------	------	------
French West Africa: Haute Volta	208	9	------	[1] 1	------	------
Gambia	5	------	------	------	------	------
Gold Coast	248	6	3	------	6	------
Ivory Coast	649	7	------	------	------	------
Libya	2	------	------	------	------	------
Mauritania	1	------	------	------	------	------
Morocco (French)	10	------	------	[1] 1	[2] 2	------
Mozambique	262	57	------	------	------	------
Nigeria	15,990	860	------	------	------	------
Niger Territory	1,092	43	------	[1] 5	------	------
Rhodesia:						
Northern	5	------	------	------	------	------
Southern	629	74	------	------	------	------
Senegal	2	------	------	------	------	------
Sierra Leone	31	------	------	------	------	------
Sudan (Anglo-Egyptian)	74	2	1	2	1	------
Sudan (French)	216	10	------	------	------	------
Togo (French)	102	------	------	------	------	------
Tunisia	1	------	------	------	------	------
Union of South Africa	647	20	5	2	------	------
ASIA						
Afghanistan	337	53	------	------	------	------
Arabia	336	------	------	------	------	------
Bahrein Islands: Bahrein	36	------	------	------	------	------
Kamaran Island: Kamaran	[4] 2	------	------	------	------	------
Burma	5,016	31	------	------	------	------
Ceylon	[3] 2	------	------	[4] 1	------	------
China	757	20	------	------	------	------
India	122,800	3,290	[5] 562	[5] 667	[5] 233	------
India (French)	367	107	32	31	24	------
India (Portuguese)	96	5	------	------	------	------
Indochina	[6] 319	13	------	------	7	------
Indonesia:						
Borneo	876	92	73	------	------	------
Java	7,220	318	45	30	------	21
Sumatra	345	1	------	------	------	------
Iran	273	19	12	6	7	25
Iraq	[3] 160	24	10	9	5	12
Israel	16	------	------	------	------	------
Japan	6	------	------	------	------	------
Korea (Republic of)	1,331	------	------	------	------	------
Lebanon	[3] 2	------	------	------	------	------
Netherlands New Guinea	3	------	------	------	------	------
Pakistan	15,852	678	226	[5] 36	[5] 36	[5] 5
Palestine	95	------	------	------	------	------
Straits Settlements:						
Singapore	[3] 2	------	------	------	------	------
Syria	15	------	------	------	------	------
Thailand	460	------	------	------	------	------
Transjordan	35	------	------	------	------	------
Turkey (See Turkey in Europe.)						
EUROPE						
Great Britain:						
England: Liverpool	[4] 1	------	------	------	------	------
Scotland: Glasgow	21	------	------	------	------	------
Greece	15	------	------	------	------	------
Portugal	1	------	------	------	------	------
Spain: Canary Islands	1	------	------	------	------	------
Turkey	8	------	------	------	------	------
NORTH AMERICA						
Guatemala	7	------	------	------	------	------
Mexico	506	------	------	------	------	------
SOUTH AMERICA						
Argentina	517	------	------	------	------	------
Brazil	97	1	1	6	------	------
Chile	3,588	------	------	------	------	------
Colombia	586	14	------	------	------	------

SMALLPOX—Continued

Place	January-September 1950	October 1950	November 1950—week ended—			
			4	11	18	25
SOUTH AMERICA—continued						
Ecuador	155	18	2	--------	--------	--------
Paraguay	4	--------	--------	--------	--------	--------
Peru	2,680	--------	--------	--------	--------	--------
Venezuela	1,526	--------	--------	--------	--------	--------
OCEANIA						
Australia: Freemantle	[4] 1	--------	--------	--------	--------	--------

[1] Nov. 1-10, 1950. [2] Nov. 11-20, 1950. [3] Includes imported cases. [4] Imported. [5] Preliminary figures. [6] Corrected figure.

TYPHUS FEVER*

(Cases; P=Present)

AFRICA						
Algeria	108	1	--------	[1] 2	--------	--------
Basutoland	24	--------	--------	--------	--------	--------
Belgian Congo	[2] 88	[3] 2	--------	--------	--------	--------
British East Africa:						
Kenya	23	--------	--------	--------	--------	--------
Mombasa	[3] 3	--------	--------	--------	--------	--------
Uganda	2	--------	--------	--------	--------	--------
Egypt	89	--------	--------	--------	1	--------
Eritrea	29	3	2	1	--------	--------
Ethiopia	1,046	--------	--------	--------	--------	--------
French Equatorial Africa	5	--------	--------	--------	--------	--------
Gold Coast	9	1	--------	--------	--------	--------
Libya:						
Cyrenaica	27	--------	--------	--------	--------	--------
Tripolitania	71	--------	--------	--------	--------	--------
Madagascar	[2] 2	--------	--------	--------	--------	--------
Morocco (French)	9	1	--------	--------	--------	--------
Morocco (International Zone)	1	1	--------	--------	--------	--------
Morocco (Spanish Zone)	6	--------	--------	--------	--------	--------
Mozambique	3	--------	--------	--------	--------	--------
Nigeria	1	--------	--------	--------	--------	--------
Rhodesia, Southern	[2] 7	--------	--------	--------	--------	--------
Sierra Leone	[3] 5	--------	--------	--------	--------	--------
Sudan (Anglo-Egyptian)	4	1	--------	--------	--------	--------
Tunisia	59	--------	--------	--------	--------	--------
Union of South Africa	75	P	P	--------	--------	--------
ASIA						
Afghanistan	1,299	4	--------	--------	--------	--------
Burma	[2] 15	--------	--------	--------	--------	--------
Ceylon	1	--------	--------	--------	--------	--------
China	[2] 20	--------	--------	--------	--------	--------
India	301	16	--------	--------	--------	--------
India (Portuguese)	47	7	--------	--------	--------	--------
Indochina	[4] 32	2	--------	--------	--------	--------
Indonesia:						
Java	6	--------	--------	--------	--------	--------
Sumatra	1	--------	--------	--------	--------	--------
Iran	[2] 193	10	1	2	2	--------
Iraq	130	--------	--------	--------	--------	--------
Japan	[2] 927	--------	--------	--------	--------	--------
Korea (Republic of)	[3, 4] 1,161	--------	--------	--------	--------	--------
Lebanon	[2] 2	--------	--------	--------	--------	--------
Netherlands New Guinea	2	--------	--------	--------	--------	--------
Pakistan	98	1	--------	--------	--------	--------
Palestine	7	--------	--------	--------	--------	--------
Straits Settlements: Singapore	[2] 8	--------	--------	--------	--------	--------
Syria	[2] 39	--------	--------	--------	--------	--------
Transjordan	[4] 28	--------	--------	--------	--------	--------
Turkey (see Turkey in Europe).						
EUROPE						
France	1	--------	--------	--------	--------	--------
Germany (British Zone)	[2] 2	--------	--------	--------	--------	--------
Germany (French Zone)	2	--------	--------	--------	--------	--------
Germany (United States Zone)	3	--------	--------	--------	--------	--------
Great Britain:						
England: Liverpool	[3, 5] 1	--------	--------	--------	--------	--------
Island of Malta [2]	35	--------	--------	--------	--------	--------

TYPHUS FEVER—Continued

Place	January-September 1950	October 1950	November 1950—week ended—			
			4	11	18	25
EUROPE—continued						
Greece	28					
Hungary	4					
Italy	47					
Sicily	36					
Poland	37					
Portugal	2					
Spain	43					
Turkey	161	13	3	3	6	7
Yugoslavia	252					
NORTH AMERICA						
Costa Rica[3]	15	2				
Guatemala	30					
Jamaica[2]	29	1		1		
Mexico[3]	342	2				
Panama Canal Zone[2]	3					
Puerto Rico[3]	[4] 17	1	1			
Virgin Islands	1					
SOUTH AMERICA						
Argentina	2					
Chile	124	4	2	2	1	1
Colombia	489	19				
Curacao	3					
Ecuador	255	8				
Peru	1, 089					
Venezuela	128					
OCEANIA						
Australia[2]	[4] 103		1			
Hawaii Territory[2]	6			1		

*Reports from some areas are probably murine type, while others include both murine and louse-borne types.

[1] Nov. 1-10, 1950. [2] Includes murine type. [3] Murine. [4] Corrected figure. [5] Imported.

YELLOW FEVER

(C—cases; D—deaths)

AFRICA							
Belgian Congo	D	1					
Stanleyville Province	D	1					
French Equatorial Africa	C	[1] 1					
Port Gentil	C	[1] 1					
Gold Coast	C	12	3	1	1		
Accra	D	[2] 2	[1] 2				
Ankobra Ferry	D	1					
Bogoso	C	[1] 1	1				
Kade	C	1					
Oda Area:							
Akwatia	C	[2] 7		[1] 1			
Atiankama	C	1					
Taquah-Aboso	D				[1] 1		
Nigeria	D	[2] 2					
Calabar	D	[3] 1					
Ibadan	D	[1] 1					
Sierra Leone	C	[2] 2					
Koinadugu District	C	[2] 2					
NORTH AMERICA							
Panama:							
Colon	D	1					
SOUTH AMERICA							
Bolivia	C	867					
Chuquisaca Department	C	[4] 850					
La Paz Department	C	[5] 17					
Brazil	D	2					
Bahia State	D	1					
Ipiau	D	1					
Maranhao State	D	1					
Colinas	D	1					

YELLOW FEVER—Continued

Place		January-September 1950	October 1950	November 1950—week ended—			
				4	11	18	25
SOUTH AMERICA—continued							
Colombia	D	4					
Magdalena Department	D	1					
Los Angeles, Rio de Oro	D	1					
Putumayo Commissary	D	1					
Mocoa Locality	D	1					
Santander Department	D	1					
Ocana	D	1					
Peru	D	8	2				
Cuzco Department	D	1					
Quincemil	D	1					
Huanuco Department	D	5	1				
Tingo Maria	D	5	1				
Junin Department	D	1					
San Ramon	D	1					
Loredo Department	D	1					
Puealpa	D	1					
San Martin Department	D	4					
Bellavista	D	1					
Juanjui	D	1					
Lamas	D	1					
Tarapoto	D	1					
Venezuela	D		2		1		
Bolivar State	D		2				
Argelia	D		1				
La Parida	D		1				
Tachira State	D				1		

---

[1] Suspected. [2] Includes suspected cases. [3] Imported. [4] Estimated number of cases reported in an outbreak in Asero Province Jan. 1-Mar. 14, 1950. [5] Outbreak in North and South Yungas Provinces.

✦ ✦ ✦

The printing of this publication has been approved by the Director of the Bureau of the Budget (August 10, 1949).

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FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

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Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele. Surgeon General

Division of Public Health Methods
G. St. J. Perrott, Chief of Division

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    Indochina — 1037, 1072, 1173, 1199, 1459
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